THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

VOL. LXVI. SATURDAY, MARCH 16, 1895. NO. 11.

ORIGINAL ARTICLES.

WRONG REFERENCE OF SENSATIONS OF PAIN.

BY S. WEIR MITCHELL, M.D.,
OF PHILADELPHIA.

IT occasionally happens that in the large clinical material seen at the Orthopedic Hospital we meet with cases that are hardly capable of nosologic classification, and yet are not without their lessons. Here, as an example, is a case so unusual that rarely have I seen one like it or even analogous to it. It is a very simple story:

T. M. was sent first to my clinic at the Infirmary for Nervous Diseases by Dr. J. H. McKee, on December 7, 1894. She was sixty-two years of age, born in Pennsylvania, and married. Her mother died at the age of ninety-five, and her father at seventy-three from "cancer." Two sisters and three brothers are well. One sister died of "florid tuberculosis" and one brother of "spotted fever." The woman has borne three sons; two are well, and one is asthmatic. She takes two cups of strong tea and two of strong coffee daily, and beer moderately. The menopause occurred between forty and forty-five years of age. She has had pneumonia twice, once at fifty-two and again at fifty-seven years of age.

On November 25, 1894, thirteen days ago, while blacking a stove, she let a heavy stove plate fall on the *right* foot, striking the toes. The great toe and the adjacent one were injured, and were discolored from the bruising. A line of blackish discoloration is still present under the nail of the second toe. But there is no swelling or redness, though some pain still persists.

Immediately on the reception of the injury she felt acute pain on the antero-internal aspect of the left leg (the uninjured side) at the junction of the upper and middle thirds. This pain extended downward into the foot and upward into the thigh. It was of a burning character, fairly constant, but worse at night. At present the appetite is good and improving, the tongue is clean, there is no vomiting, but the woman has an occasional headache attended with nausea.

The heart's action is rhythmic, the sounds distinct. The vascular tension is moderately increased. The radial and temporal arteries are tortuous and resistant. There is slight vertigo, no dyspnea, and no swelling of the feet. There is an increased frequency of micturition, both nocturnal and diurnal. The urine contains no albumin or sugar and has a specific gravity of 1022.

The woman has lost flesh in the last two weeks. She has not had chills, fever, or sweats. She sleeps poorly and worse since the accident. Memory is good and hearing is fairly good, but the eyesight is poor, although improved by glasses. The station is a little unsteady. The knee-jerks are active, and sensation is apparently normal. There is no history of traumatism of the left leg. But the left tibia is now more sensitive than the right. It is particularly tender in the middle third, on the inner and outer margins. The left leg is also more florid and the temperature feels higher. There is no inflammatory or other deposit present. An electric examination of the tibial group of muscles shows a slight quantitative decrease to the faradic current. There is no galvanic change.

On December 21, 1894, the woman was better, and continuance of the electricity was ordered. On January 8, 1895, constant gain was reported.

I have personally gone over the case with extreme care, and see no cause to disbelieve the statement made by the patient. She declares that, having had a heavy weight fall on the right foot, there was at once a pain in the left shin, so sharp as to distract her attention from the quite severe injury received by the opposite member. Also she declares that the referred pain has now, for three weeks, survived that of the part hurt. The ache in the front of the left leg is becoming better since the use of galvanism and frictions.

This case, unusual as it is, seems not to be unique. In fact, I came yesterday, in Sharkey on *Epilepsy*, upon a case in which the pain caused by an injection for gonorrhea was felt as an acute pain on top of the head. A careful search through the books might enable us to find like instances. So far, however, Dr. Burr has not been fortunate in this search, probably because the cases are nowhere indexed as wrongly referred sensations. I myself recall two of which I have personal knowledge. One was that of a man who, having a felon on the right thumb, had, until it was relieved, severe pain in the opposite thumb. The reference thus was to both thumbs, and not from a foot to a non-symmetric part of the opposite limb. In another case, in which an omnibus-window was let fall on a finger on which was a felon, there was with the pain of the finger a brief but violent pain of the face and neck of the other side.

I have also some remembrance of having many times heard during the great Civil War, from men shot, statements as to their having felt the wound as pain in some remote part of the body. In the notes

of that time made by Morehouse, W. W. Keen, or by me, I find, in fact, interesting examples of the kind of referred pain seen in this woman.

One was the case of Captain now Admiral Strembel, who, being shot through the right side of the neck, had with reflex paralysis of the left arm and also pain in that unwounded member. Other instances are as follows:

CASE II, of Circular No. VI, 1864.—A shell-wound of one leg (right) at once gave rise to burning pain in both feet and in the right arm and right pectoral region.

CASE IV.—A wound of the testicle was referred to the back, where alone was any pain felt.

CASE V.—A shell-wound of the outer side of the left thigh with immediate reference of pain to the same area on both thighs. The man thought, indeed, that he was shot through both thighs. Other of our cases exhibited similar phenomena of cross or symmetric or non-symmetric reference of the pain of a wound.

CASE IV, in Hutchinson's series, p. 313, is one of injury of the median and ulnar nerves which gave rise to pain in the opposite hand. Pirogoff has a report of the same form of cross-reference from a wound. Such false reports as to the seat of a pain-cause are not rare as regards the branches of a single nerve. A familiar example is seen or felt in the widely referred pain from an exposed dental nerve.

Our present case does not stand alone. Nevertheless, instances of cross-reference are rare enough to make it worth while to call them to your attention. This woman's case serves to remind me of other facts of like nature, but by no means identical.

One of my older friends, now dead, a naturalist of great distinction, had on one leg a small mole. If this was roughly rubbed or pinched, he had at once a sharp pain in his chin. More interesting are the cases in which after a nerve-section, or late in a neuritis, there is a reference centrad of a touch at some lower point. I long ago described this class of facts, and not very successfully commented upon their cause. In a book on remote histories of nerve-lesions, by John K. Mitchell, now in press, there are many illustrations of this form of referred touch-sense. He has also still more curious cases of sensations referred peripherad or to a remote region.

The unusualness of the present case lies in the continuance of pain in the remote region long after the seat of the originating cause had ceased to be painful.

I do not think that we are as yet prepared to reason upon some of these symptoms. As to what is to be said or has been, I refer the curious to the book I have just now mentioned. One can, in a measure, comprehend that a violent stimulus to a sensory nerve may be switched off on to other nerve-tracts or centers, as if it were the escape of an over-charge; but, even if we hazard such an hypothesis, it is still difficult to explain the persistency of certain of these transferred impressions, for it is a law of the receiving centers for painful impressions that when the cause of the pain ceases to be active the feeling of being hurt ends. But in some of these examples of false reference of pain there must have been made in a center some more or less permanent change that continuously represents the effect to which any pain-making agency usually gives rise.

THE EFFECTS OF TOBACCO-SMOKING IN MODERATION AS PREVENTIVE OF PULMONARY DISEASE.

BY CHARLES J. MONTGOMERY, B.S., M.D.,
OF AUGUSTA, GA.

EVERY now and then an article appears in a popular magazine or newspaper setting forth the evils resulting from the use of tobacco. As this indiscriminate condemnation of a luxury enjoyed by thousands has little or no effect, it is not often that anyone takes the trouble to say a word in its favor. That the excessive use of tobacco produces at times grave results no one will deny. This is also true of the excessive consumption of certain ordinarily wholesome articles of diet, and is especially true of many valuable medicines. But that these articles of food and these medicines should for that reason be condemned as altogether without virtue would indeed be unreasonable, yet no more so than to condemn the smoking of an occasional cigar, if it can be shown that this is not only not injurious, but in certain cases actually beneficial.

It is not my purpose to present indisputable proof that smoking is at times beneficial, but merely to offer a few suggestive thoughts and to present reasons tending to show the high degree of probability of benefit, especially in relation to certain pulmonary affections. Unfortunately this proof must remain to be demonstrated by future observers in the field of experimental therapeutics and bacteriology, for as yet too few experiments and observations have been made on this subject to enable one to speak with any degree of certainty. After a careful study of the literature on the subject of tobacco I find that there is but little known of the action of its smoke, it being apparently assumed that when we are told the physiologic effects of tobacco or its alkaloid, nicotin, when taken into the stomach and circulation of a man or lower animal we should be satisfied. Considering the fact, however, that one who smokes tobacco takes but a trace of nicotin into his stomach, while the smoke is filling his mouth and entering his lungs, it seems but reasonable to presume that the effects produced, whether

for good or evil, are dependent almost wholly on the effects of the smoke.

For fear of misapprehension, I will here state that of those who smoke cigars and pipes there are but very few in whom the smoke drawn into the mouth is directly inhaled except in very small amount, but it chiefly enters the lungs subsequently on account of the air of the room being heavily laden with smoke. The majority of cigaret-smokers, however, usually inhale the smoke directly into the lungs before blowing it out of the mouth. Tobacco-smoke contains only the smallest trace of nicotin, but does hold several volatile bodies, mainly pyridin, picolin, lutidin, and collidin, which are said to have "somewhat the same action as nicotin, but less severe." It also contains hydrocyanic acid, hydrogen sulphid, phenol, and creosote. Phenol and creosote are invaluable in medicine for their antiseptic and bactericidal properties, and seem in certain conditions to exert a most beneficial action when applied locally. Hydrogen sulphid was at one time extensively used in the treatment of pulmonary troubles, and while this treatment is now rarely, if ever, employed, it is possible that by inhalation it might be of some small degree of benefit, especially when combined with more active substances. With regard to hydrocyanic acid, its calmative action on the lungs is well known. Tobacco itself has for a long time been used as a parasiticide, and the late Professor Formad, of the University of Pennsylvania, used to say that if the saliva of a man who did not use tobacco was injected into a rabbit the animal would die in convulsions, while the saliva of "smokers" had not nearly so toxic an effect. Is it not probable that this is so because the poisonous ptomains and bacteria which saliva ordinarily contains are rendered innocuous by constant contact with the smoke with its contained phenol, creosote, etc., and, if so, is it not likewise probable that this smoke when inhaled will kill or render inert microörganisms with which it may come in contact in the bronchial tubes, and in less degree in the lungs? And while we must probably allow that too small a quantity of the smoke as a rule enters the lungs to act in this manner, yet if the approaches to the citadel are protected the castle itself is secure. It is well known that certain chronic pulmonary diseases are largely due to the presence and activity of microbes.

I have thus referred to the subject from its antiseptic and bactericidal aspect. I will now say a word as to the physiologic effect of tobacco-smoke on the pulmonary circulation. As this effect is produced through the influence of the nerves, I first mention a few anatomic and physiologic facts prefatory to treating the subject from a physiologic standpoint. The nerves that supply the lungs are derived from the anterior and posterior pulmonary plexuses, which are formed mainly by the pneumogastric and sympathetic nerves, and for our present purpose we may only consider the pneumogastric, which is what is called a mixed nerve, *i. e.*, one supplying to certain regions motor influence, sensory, vasomotor, etc. This nerve is not only distributed to the lungs, but is the inhibitory nerve of the heart, preventing its too rapid action, and when stimulated, causing it to beat more slowly. Some of its branches are distributed to the larynx, pharynx, etc., not to mention other distribution, which does not concern us in this article. Now, the stimulation of an afferent nerve will, as a rule, increase the tonic influence of the vasomotor center, and through reflex action will cause a considerable constriction of certain arterioles and consequent local anemia. Now, it is more than probable that when the terminations of the pneumogastric and other nerves connected with it which terminate in the mouth, pharynx, etc., are stimulated there will be produced by reflex action a constriction of the pulmonary arterioles and capillaries. In tobacco-smoke we have an agent that at first stimulates the peripheral terminations of the pneumogastric. (When used to excess it is later a depressant of that nerve, but we are speaking of its use in moderation.) It also stimulates the peripheral terminations of the glosso-pharyngeal, the fifth, etc. The result of this stimulation of the pneumogastric is that by its reflex cardiac action the heart is slowed, while by its reflex vasomotor influence on the pulmonary circulation there is a constriction of the pulmonary arterioles and capillaries, and a mild degree of pulmonary anemia, or if there were previously a tendency to congestion, there would result an approach to a normal condition.

Now, as chronic pulmonary affections are largely dependent on chronic congestion, it is evident that a simple agent which tends to relieve or prevent this congestion is greatly to be desired. Here, then, is a condition in which a cigar is a blessing. The sedative action of tobacco-smoke on the lungs in cases of asthma, etc., is well known. How much of this is due to its hydrocyanic acid, how much to its creosote, its collidin, etc., or how much to the combined effects of all, is at present unknown; but the fact remains that it often affords relief. Perhaps it is partly due to its lessening local congestion in the bronchioles, as already described, as well as by allaying the spasm of their muscular coats. If, therefore, we have in the smoke of tobacco an agent that will destroy germs or prevent their development in the mouth, and to some extent in the bronchial tubes, and will relieve or prevent pulmonary congestion, is not this smoke a preventive of pulmonary disease? I may here add that even in those who smoke to great excess and inhale the smoke there is rarely, if ever, produced by it any

direct injury to the lungs, unless it be due to certain extraneous causes, such as the paper covers of the cigarets being improperly made, and giving rise when burned to certain extremely irritating or poisonous substances being mixed with the tobacco-smoke, or, of course, by excessive smoking the general health might be so impaired and the vitality so lowered that the lungs, as well as other organs, would then be unable to resist disease. When care is taken that the covers for cigarets are properly made, as in France, where the Government regulates this, it is most probable that there rarely if ever would result any direct injurious effect on the lungs by the smoke of tobacco even in the form of cigarets and direct inhalation of the smoke. Though we must not forget the *reflex* effect of an *excessive* amount of smoke, when the primary stimulation of the pneumogastric being followed by subsequent depression, there would result an increased frequency of heart-beats, dilatation of pulmonary arterioles, and consequent pulmonary congestion, which condition would be favorable to the development of disease.

It may be well, before concluding, to allude to the apparent protection against pulmonary disease which is afforded by working in tobacco-factories, though this is not universally acknowledged. In Stillé's *Therapeutics* we find it stated that "according to Dr. Rueff chronic pulmonary affections are infrequent among tobacco-workers, and he even affirms that some among them who enter the factory with emaciation, hemoptysis, and cough, have there got rid of their pulmonic symptoms." According to the same authority, in the tobacco-factories at Bordeaux, "consumption is unusual among the operatives, and the disease advances less rapidly in them than in patients placed under different circumstances." He further adds, "that in most of the tobacco-factories it is far less frequent than among the surrounding population, and indeed is in some quite unknown." Many others have made similar observations. So, while tobacco and its smoke have not received the scientific attention they deserve, enough is known about them to indicate it to be highly important that more careful study should be bestowed on these subjects, which are of such vital interest to humanity.

COSMIC DUST.

The Living Organisms Therein in Relation to Disease.

BY THOS. S. BLAIR, M.D.,
OF HARRISBURG, PA.

AN article I prepared upon this subject and published a couple of years ago has aroused so much interesting criticism that I have carefully investigated the subject anew, and venture to present it to the profession. At first sight it appears quite speculative, but I believe it warrants serious investigation.

That thousands of tons of meteoric matter and cosmic dust are annually precipitated upon the earth, and that the amount of such deposit is subject to great variation, are generally admitted. That much of this matter is permeated with life-germs has been announced by a few observers. Darwin described a shower of strange organisms covering an area of over a million square miles, proving by its extent an origin probably beyond the limits of our atmosphere. In a fall of yellow snow at Peckeloh, Germany, Weber found myriads of germs. A most remarkable cosmic shower occurred in 1755 in Northern Italy. The precipitation embraced an area of about two-hundred square leagues, and was an inch in depth at places, the Alps also being covered with a colored snow to the depth of nine feet. In October, 1846, a shower of microscopic organisms was observed in France, and over one-hundred different forms were described of a character similar to that of no known species. Ehrenberg estimated that forty-five tons of organic germs fell in this shower. In 1803 Italy and all Southern Europe were visited by a similar shower, and ten years later Calabria was the scene of a like phenomenon. Palestine and also Western Kentucky have had such showers. It is hardly reasonable to infer that the immense amount of organic matter in such showers is all of terrestrial origin. Recent investigations have proved colored snows to be filled with organisms, and the polar snows are said to have yielded more than three-hundred different life-forms. These organisms can hardly be produced in our atmosphere, millions of hundred-weight of them, according to Dana, having fallen since the days of Homer, who first described them in the *Iliad*. I have given but a partial list of such phenomena, and am indebted to Professor I. N. Vail for some of the data presented.

It is regarded as proved that all terrestrial matter, except as influenced by igneous action, contains living germs. Matter is matter throughout the universe, and it requires no stretch of imagination to believe that bacteria exist upon other planetary bodies and in the cosmic clouds in interplanetary space. It is quite probable our burned-out earth had remained sterile had no life-forms entered it in this manner, as life does not generate *de novo*. It is very reasonable to suppose that when "the primordial seas," geologists tell us, fell to the earth, they carried to it many forms of living matter, possibly in their present, but very much more likely in antecedent forms. We have seen that over three-hundred forms of life-germs, of presumably non-terrestrial character, have been discovered in cosmic-dust showers. From what we know of germs in general *some* of these forms must have pathogenic proper-

ties. Many, of course, are dead, others are myceliæ, and but a portion bacteria. Many of the latter are undoubtedly non-pathogenic. It is unfortunate that cultures of these germs have not been made and their properties tested; but granting that no single one among them is possessed of specific pathogenic influence, we know that their action, if present in great numbers, would be deleterious to higher animal life, because any species of bacteria existing in sufficient quantity has such qualities. Very fatal epidemics of intestinal and other disorders have resulted from the mere accumulation of filth in which bacteria rated as non-pathogenic abound.

Careful observation has shown that the amount of cosmic matter descending in occasional notable showers, great though it is, is but small compared to the constant imperceptible additions of such matter to the earth. Hence, if cosmic germs influence the health of higher animal life on the earth the factor is a constant one. Bacteria reaching us from an environment differing from that they find here might at once perish because of temperature-changes or lack of the necessary elements for their growth, and so be negative in their influence, and doubtless many forms are so. Countless myriads of the cosmic germs reaching us are dead, presumably because of the intense cold of space, but it is remarkable how tenacious of life are some germs and the spores of most bacteria. Certain varieties will thrive in ice. I have not the article at hand, but I remember reading detailed experiments made about 1889 that proved that the ordinary bacterium termo could, in successive generations of its growth, be gradually subjected to greater and greater heat until germs were made to thrive in a temperature fatal to their ancestors. Some of these germs might live for a time and then die out. If they did, any disease they might engender would die with them.

In the fourteenth century the so-called "Black Plague" *suddenly* came upon the world and carried off nearly fifty-million victims. It was apparently a specific germ-disease and spread much faster than the lines of commerce could carry it. It seemed to be everywhere, on sea and land. An old chronicle says: "The impure air was actually visible as it approached with its burden of death, and a dense and awful fog was seen in the heavens." On several occasions peculiar clouds have accompanied plagues. What caused the black plague, and why has it ceased from off the earth? That the earthquake and volcanic eruptions preceding it could be the cause will hardly stand scientific scrutiny, nor will the presence of filth and the lack of food account for a specific disease of uniform type throughout the known world. On the theory that the plague was caused by cosmic germs, these difficulties are removed, and its widespread character understood. Its cessation might be ascribed to the earth swinging out of range of the cosmic dust carrying the germs, which, not finding proper environment on the earth, ceased to multiply, and so became extinct. The old type of "spotted fever" could be accounted for on like grounds. It is almost unknown now, and much resembled the "black death" of 1866 and 1867, which is now an extinct disease. Between the years of 1811 and 1846 epidemic cerebro-spinal meningitis largely prevailed as a practically new form of disease, and was widely spread and very fatal. The epidemic form of this disease has all but disappeared. Here, then, we have a group of epidemic affections coming unannounced and as quickly disappearing. Demonstrated theories do not account for this.

In a second group might be placed diseases presumably caused by an influx of large numbers of previously unknown cosmic germs, finding a suitable habitat only in certain regions, and, after the *first advent* of the affection, *limiting* their influence to that portion. Yellow fever is a marked instance in point. First appearing at the end of the fifteenth century, it was widely diffused, but, probably when new accessions of the germs causing it ceased, the disease limited itself to regions where they found suitable soil. Be this the cause of the limitation of area amenable to the disease, or not, we know that at present yellow fever is limited to an area within 48° of the equator, and to no more than 2500 feet above sea-level. Dengue or "dandy fever" is of this group. Coming suddenly in 1827, it gave Philadelphia pathologists an opportunity to speculate upon "jimson weed" and other equally amusing etiologic factors. It is still attributed to many causes, but we know it soon died out except in southern latitudes, because it is probable the germ can only flourish there.

The large group of epidemic diseases, such as typhoid fever, diphtheria, and scarlet fever, are commonly designated "filth-diseases," and they will doubtless be held more and more in check as civilization advances along hygienic lines; but these epidemic manifestations not caused by filth have always been a puzzle to me. Our most recent plague, "la grippe," has prompted this investigation on my part. It also came suddenly. It prevailed throughout nearly the whole world, and, in a few weeks' time, was "quite the style." It came insidiously, as the latest popular song, and all manner of theories have been advanced as to its cause. Most of them attribute it to some peculiar quality of the atmosphere irrespective of prevailing winds and lines of travel. Sensible people readily enough admitted that electric currents or an excess of ozone was its cause, simply because such speculation is "the order of the day." I am well aware that the

germ-theory of disease is being overdone, and that bacteria are supposed to cause nearly all ills except old age, poverty, and credulity; but, looking at the matter candidly and without conventional bias, it has appeared to me at least reasonable to attribute this disease to cosmic germs. The history of the affection thus far lends color to the view. Were I a prophet I would predict that every winter for a few years yet we will have more or less influenza, but that in ten years it will be practically extinct.

Finally, I may say that while the foregoing theory seems to me to be reasonable and explanatory of some scientific puzzles, it will require elaborate research at the hands of many investigators for its full establishment or for its entire overthrow.

PRELIMINARY NOTE UPON A FEW OF THE CHANGES FOUND IN THE FIELDS OF VISION WHILE THE EYES ARE PLACED AT RIGHT ANGLES TO THEIR ORDINARY POSITION.

BY CHARLES A. OLIVER, A M., M.D.,
ATTENDING SURGEON TO THE WILLS EYE HOSPITAL; OPHTHALMIC SURGEON TO THE PHILADELPHIA AND PRESBYTERIAN HOSPITALS, ETC.

IN the fall of 1893, during a conversation with Dr. S. Weir Mitchell, of this city, he spoke to me of the advisability of conducting a series of scientific experiments in order to determine why it is that a more vivid color-impression of a distant landscape can be obtained when the head is bent down into a horizontal position. To perform these properly Dr. Mitchell suggested that a study of the relative values of both form and color-fields whilst the head is held in the ordinary upright position and whilst it is lowered into as near a horizontal one as possible, might be of use in determining the reason.

These experiments, which I performed with the aid of a number of assistants and friends, will be fully explained in a paper that, although finished some several months ago, is being reserved for later publication.

After duly considering the differences of color-values when reflected through the various meridians of the dioptric media and the increase of physiologic power from greater blood-supply to the organ when the head is held in the lowered position, the conclusions reached in this paper, after some two hundred or more experiments, show definitely that such a change in the position of the eye practically brings the most sentient portion of the retinal sheet into a situation that allows it to receive impressions from a part of a distant view that ordinarily impinge upon a lower grade of material, which gives a less vivid and a less detailed visual picture.

Dr. D. Hack Tuke, the well-known alienist and author, died in London on March 5th, at the age of sixty-eight.

CLINICAL MEMORANDA.

ASTHMA AND ANEMIA RELIEVED BY REMOVAL OF NASAL POLYPI.

BY J. B. SCOTT, M.D.,
OF GETTYSBURG, PA.

ALTHOUGH it is well known that nasal affections cause asthma, it would appear from the history of this case that the fact is not generally given the recognition that its importance demands. I therefore report the case just as it happened, because it seems to constitute a strong plea for the more general examination of the nasal passages in diseases of the respiratory tract, and also of the circulation.

Five years ago, an elderly lady came to me for treatment for bronchitis, asthma, and a condition of general malnutrition. She was anemic; the pulse was irregular both in frequency and in power; there was no cardiac murmur. *The nasal passages were not examined.* The bronchitis and the general condition improved under treatment, but the asthma was uninfluenced. At the close of the summer she changed her residence, and during the five years past has resided in several of the cities of the Middle and Southern States. In each place she was treated by physicians of reputation, some of whom were eminent. The result was invariably the same, some improvement in the bronchitis and general health, but the asthma grew worse. *None of the physicians examined the nose.* Last summer she again came to me, and greeted me with the remark: "Doctor, I don't expect you to relieve the asthma; it seems no one can do that in all these years, but if you can only give me something to relieve the awful dryness in my mouth at night, so that I can get a little sleep, I will be grateful."

As there was no local disease of the mouth to account for the dryness, mouth-breathing due to nasal obstruction occurred to me as a possible explanation of the symptom, and an examination was made through the nasal speculum. The left nostril was seen to be literally packed full of mucous polypi, while in the right passage a big one, looking like an oyster, acted like a ball valve, alternately opening and closing the slight air-current that found room to pass. Here seemed to be the solution of the whole problem. Nasal respiration being impossible, the mouth necessarily remained open and became dry, while the inspired air, deprived of the warmth and moisture normally imparted by the nasal mucosa, irritated the bronchial tubes, and maintained the chronic inflammation. The feeble and irregular circulation was due to a reflex action on the heart.

The patient having been told that some benefit might result from removal of the polypi, readily assented to the operation. The polypi were attacked with a Bosworth's snare and Allen's forceps. I say "attacked," because it proved to be a right bloody battle before they were gotten out, but it ended in victory, for that night the patient was entirely free from asthma—a new experience to her. The next night, however, there was a slight return. Examination showed that a small polypus, which had pressed out from one of the recesses of the cavities, after the removal of the others, was obstructing the passages. It was removed, and with it disappeared the last vestige of the asthma. Three months have

passed without any attack, while before they were of nightly occurrence.

Although a sharp exacerbation of the bronchitis resulted from exposure to cold, it was unattended with any asthmatic symptoms. It, therefore, seems clear that the asthma was due to the polypi, because it stopped on the removal of those obstructing the passage; it recurred when one hidden from view at first appeared in the left cavity, and because the exacerbation of the bronchitis was not attended by any asthmatic paroxysm. *The whole physical condition of the patient was improved*, probably as a result of the more perfect respiration, and consequently more perfect oxygenation of the blood. The varied experience of this patient seems to show that, even in certain high places, examination of the nasal passages is not a routine measure, and it certainly shows that it ought to be in diseases both of the respiratory tract and also of the circulatory system, particularly in *anemic* cases.

PAROXYSMAL HEMOGLOBINURIA DUE TO COLD.[1]

BY LOUIS FAUGÈRES BISHOP, M.A., M.D.

MY patient was a male, fifty-five years old, a native of Denmark, a sailor, whose father died of apoplexy and mother by accident. One brother died of pulmonary tuberculosis, one sister died of inflammation of the bowels, and two sisters are living. The man had smallpox in 1871, yellow fever in 1854, malarial fever in Savanhah in 1860, but in all cases made good recoveries. About twelve years ago, after exposure to extreme cold for a long time, he passed blood-colored urine, with a stinging sensation along the urethra. Since then, whenever he is exposed so as to get his hands and feet cold, the blood-colored urine has reappeared. During the winter he has suffered severely on account of the severity of the weather. During warm weather he has never had an attack. During the past four weeks there have been ten or eleven attacks. When the attack comes on there is a very urgent desire to urinate, and urine is passed in spite of efforts to retain it. This happens as long as the urine is very dark, but when it becomes clearer the desire is not so urgent. He has had severe attacks of pain in the back for eight or nine years. When the urine contains blood-pigment the amount is diminished.

There are no signs of cystitis or of stricture. In summer, when he is free from the ordinary attacks, he is troubled with attacks of cerebral symptoms at night, during which he rises from sleep, frightened, and imagines that there is someone going to put him in a barrel, etc. He drinks bitters, and about five or six glasses of beer daily, occasionally a little whiskey. In 1859 he was exposed in a wreck, at which time a companion was frozen to death. He served in the army during the war, and was much exposed. He attributes his disease to exposure. He can produce an attack artificially at any time by voluntary exposure to cold. An examination of the urine between the attacks was negative; during the attacks a small amount of albumin was present, and it contained much blood-pigment, but very few blood-cells; there was a deposit of a very heavy brownish sediment. It seems very probable that this man's idea of the cause of his disease, namely, exposure, is the true one.

The recurrence of cerebral symptoms replacing the attacks of hemoglobinuria is curious. Dr. William Osler mentions a case in which epileptic seizures occured at the same time as attacks of hemoglobinuria; here we have cerebral symptoms occurring at the times when the attacks are absent. In this case there is nothing to suggest Raynaud's disease, which has frequently been associated with this condition. The sufferings of this man are great, and as there did not seem to be any way of influencing his condition by medication he was advised to take up a permanent residence in a warm climate, but it would be disastrous should the cerebral symptoms become more frequent in the absence of the attacks of hemoglobinuria.

36 WEST THIRTY-FIFTH STREET.

[1] Read before the New York County Medical Association, February 18, 1895.

BACTERIOLOGIC REPORT.

A DETAILED REPORT OF SOME EXPERIMENTS IN THE PRODUCTION OF THE DIPHTHERIA-ANTITOXIN.[1]

(*From the Bacteriologic Laboratory of the Medical Department of the University of Wooster, Cleveland, Ohio.*)

BY A. P. OHLMACHER, M.D.,
PROFESSOR OF PATHOLOGY AND BACTERIOLOGY.

THIS report has for its object the description of a series of experiments in the manufacture of the diphtheria-antitoxin, which, with the support of several of my colleagues,[2] have been recently completed. While I have in the main followed the directions of European authorities for the production of the antidotal diphtheric serum, my methods have varied in certain particulars from those prescribed. Aside from this, many technical difficulties have been encountered and overcome which are not clearly described by the authorities in this work, so that it is hoped this report will contain some valuable suggestions for others engaged in similar experiments.

The diphtheria-bacillus employed was isolated from a throat-swab sent to the laboratory by Dr. Charles Gentsch, of Cleveland, November 4, 1894. The patient from whom the swab was obtained was a girl, five years of age, who presented the clinical symptoms of a moderate attack of diphtheria. The false membrane partially covered each tonsil. The child recovered perfectly in four or five days. Four days before the illness of this child, her brother, aged six years, had died of diphtheria, which invaded his larynx.

The diphtheria-bacilli that appeared in the eighteen-hours' culture on Loeffler's medium were separated

[1] Read in abstract before the Cleveland Medical Society, February 22, 1895, and illustrated with specimens showing various stages of the work.

[2] I take this occasion of returning thanks to my friends who have, in various capacities, assisted me during these experiments.

Dr. H. W. Kitchen obtained the horse, and Dr. C. B. Parker kindly placed his stable at our disposal. Dr. I. J. Kerr assisted at most of the operations on the horse. Dr. Cooley aided us in locating the jugular vein at the first bleeding, and Mr. C. F. Nelson has been useful in many minor but essential capacities.

from the only other contaminating organism (*Diplococcus lanceolatus*) by the employment of scratch-attenuations on plates of Loeffler's medium. Morphologically, the isolated bacillus was found to be an extreme type of the long, irregular, beaded variety of the *Bacillus diphtheria*. In fact, in its early cultures this bacillus showed a tendency to form longer rods than I have ever seen in the diphtheria-organism. While this fact is emphasized, it is not my opinion that the length of a diphtheria-bacillus bears any constant relation to its virulence, as some observers contend; and I hope to show in a future communication that a very short bacillus may be found to possess even greater pathogenic properties than a long one. It fortunately happened, however, that this particular example of the Loeffler bacillus possessed very virulent properties, and that its virulence was retained to a remarkable degree.

After isolating the bacillus in pure culture its virulence was tested by injecting 0.5 c.c. of a twenty-four-hours' bouillon-culture under the skin of the belly of a healthy guinea-pig weighing 350 grams. Precisely twenty-four hours after the injection the animal died, with the usual symptoms of diphtheria-intoxication preceding its death. An autopsy made fifteen minutes after the death of the animal revealed all the usual lesions of experimental diphtheria.

In the interval before commencing the manufacture of the toxins the isolated bacillus was tested by the usual cultural methods. It was found to grow typically in gelatin without liquefying the medium; to produce acids first and alkalies later, in glucose-litmus agar; to make "invisible" growths on potato; and to multiply in milk without coagulating it.

THE MANUFACTURE OF THE TOXINS was commenced November 18, 1894, when 250 c.c. of ordinary neutral beef-peptone-bouillon were inoculated from the sixth generation of our bacillus, which had been all the while grown on Loeffler's medium.

In the preparation of the first lot of toxins the method of Roux was partially followed. The bouillon was kept in a large Erlenmeyer flask, with a side-neck, both the mouth and the side-neck of which were stopped with cotton before the sterilization of the flask and its contents. The bouillon-culture was allowed to grow for twenty-four hours in the incubator, after which the side-neck of the flask was connected with a Chapman aspirator, and a current of the moist air from the incubating chamber was drawn over the top of the culture. The aspirating apparatus was disconnected at the end of one week, and the culture was kept in the incubator till November 30th. The purity of the bouillon was now tested by scratch-attenuations on plates of Loeffler's medium, and, as no foreign organisms were found, the bouillon was passed through a Kinyoun filter. To the clear, yellow, germ-free filtrate ½ per cent. of carbolic acid was added. This carbolized filtrate was our diphtheria-toxin, and it was kept at the ordinary laboratory-temperature until it had all been used.

The potency of this lot of toxin was tested according to the standard formula. With the aid of the long, graduated pipet of a Petri syringe, 0.1 c.c. of the toxin was injected under the skin of the abdomen of a lively guinea-pig weighing 400 grams. During the first twenty-four hours the animal showed no signs of illness. At the end of thirty-six hours it was decidedly sick, and presented the same symptoms of intoxication shown by the pig previously inoculated with the bouillon-culture of the living diphtheria-bacilli. The animal died between the fortieth and forty-eighth hours. The autopsy showed, in an exaggerated form, all the lesions noted in the pig killed with the bouillon-culture of the same bacillus.

After the completion of this first lot of toxin, more of the material was prepared. In all of the later products I have done away with the troublesome methods of attempting to "force" the cultures by currents of air or oxygen. In fact, in my own work I have departed, in certain particulars, both from the French and German formulæ. The French method, proposed by Roux, consists in forcing the bouillon-cultures with currents of moist air, with the employment of a formidable battery of special flasks; and the culture is grown for a month, when it is filtered with bacteriologic precautions to prevent contamination, no disinfectant being added to the filtered toxins. This method takes too long; the elaborate apparatus is expensive, and, I believe, useless; and the finished toxins are liable to become infected unless the most rigid precautions are taken in handling them.

The Germans grow their bouillon-cultures for two or three weeks in ordinary flasks, then add carbolic acid or trikresol, and employ this mixture, containing the dead bodies of the bacilli. This method has the merit of simplicity, but I cannot convince myself that the injection of the immense masses of dead diphtheria-bacilli[1] is desirable, to say the least. I have, therefore, adopted an intermediate method of making my later toxins.

Ordinary sterile, neutral, beef-peptone-bouillon (about 800 or 900 c.c.), contained in a common liter bacteriologic flask, is inoculated and set in the incubator. Once a day the flask is agitated, to distribute the bacilli that tend to settle to the bottom of the flask. It will be noticed that, like bouillon-cultures of other bacteria, the diphtheria-bacilli grow diffusely in the bouillon for the first few days, and then settle to the bottom of the medium. At the end of two or three weeks in the incubator the bacilli will be found to have entirely subsided to the bottom, and the overlying bouillon will be comparatively clear. The bouillon-culture is now tested for contaminating organisms, and, if found to be pure, ½ per cent. of trikresol is added, with agitation to secure its solution. After standing an hour or two the bouillon is filtered through any one of the unglazed porcelain filters employed by bacteriologists. The resulting brilliant, pale-yellow fluid containing ½ per cent. of trikresol is the finished product. It contains no bacteria, and, in virtue of the trikersol,[2] no bacteria can

[1] At this point I may remark that I can see absolutely no excuse for the employment of the very dangerous methods in which the *living* diphtheria-bacilli are used to secure immunity in the horse. We know altogether too little about the ultimate relation of the living bacilli to their host; and from experiments on smaller animals it would not be surprisiug to find that the horse will ultimately succumb to a chronic diphtheric cachexia after inoculation with the living bacilli. These objections are especially significant, it seems to me, as we can secure an equally powerful immunity by a much less dangerous method.

[2] Trikresol is employed in preference to carbolic acid because it is claimed that is not so toxic for animals, and that it is a more

develop in it, even though it be kept in an ordinary stoppered bottle and handled without special precautions. These toxins may be kept at the ordinary room-temperature, and while it may be preferable to keep them in the dark, I have not observed any diminution of virulence in a lot of the toxins kept in the light of the laboratory for several weeks.

A liter of toxins from the eighth generation of our diphtheria-bacillus was finished January 14, 1895. During its stay in the incubator this culture was exposed to some hardships, for, owing to the extremely cold weather, and to an imperfect gas-regulator, the temperature of the incubator varied, on several occasions falling to 30° C., and several times rising to 40° C.

This lot of toxins was tested on January 15, 1895, by injecting 0.1 c.c. into a guinea-pig weighing 390 grams. Twenty-four hours after this injection the animal was very sick. Between the thirtieth and thirty-sixth hours it died, with the usual symptoms.

This lot of toxins has been used for the immunizing injections in the horse from January 15th to February 12th, and it has been kept in an ordinary glass bottle at the laboratory-temperature all of the time. Although it has been tested several times, it has never failed to kill a guinea-pig inside of thirty-six hours in an injection of 0.1 c.c., showing it to be a more powerful product than the first lot made from an earlier culture with the aid of the "forcing" method.

As these toxins are all that could be desired for potency, I conclude that a little fluctuation in the incubating temperature is not harmful, and that the efforts to increase the intensity of the toxins by growing the cultures at a higher temperature than that ordinarily maintained in our incubators are useless. In fact, I may here remark that my experience only strengthens my conviction that the whole secret of intensely virulent toxins lies in the employment of a variety of the diphtheria-bacillus that happens to possess a high grade of virulence when it is implanted into the bouillon. I do not believe it possible to intensify the virulence of its toxin-production by artificial means once the bacillus has gained access to the culture-medium. Undoubtedly such factors as the composition and reaction of the bouillon culture-medium have considerable influence in determining the character of the toxins manufactured by the bacilli, but these factors are quite as much beyond our control (in their finer relations), and are as much matters of chance, as is the virulence of a given variety of the diphtheria-bacillus. Our bacteriologic technique is not above scientific reproach, and the last word on the question of variation in bacteria has by no means been spoken.

It has only been in the last lot of toxins, from the ninth generation of our bacillus which was obtained three months ago from the patient, that a diminution of virulence has been observed. In order to attempt the restoration of the lost virulence I shall resort to a method that I have recently found very effective in some other experiments with the diphtheria-bacillus, and that differs in one respect from the usual method. I shall inject a half a cubic centimeter of a twenty-four hours' bouillon culture of the bacillus under the skin of the abdomen of a guinea-pig. As soon as the animal has died a bacteriologic autopsy will be made, and instead of recovering the diphtheria-bacilli from the local focus of infection, as is ordinarily done,[1] pieces of the liver, spleen, or adrenals will be transplanted to bouillon; and after two or three days tubes of Loeffler's medium will be inoculated from these bouillon-tubes, when the bacilli will be recovered, and if they are found to have acquired increased pathogenic property they will be employed in making a stronger lot of toxins. This prediction is made with due conservatism, however, for my increasing acquaintance with the inexplicable variations of the diphtheria-bacillus has tended to diminish my feeling of security in any particular experimental method.

AS TO THE PRODUCTION OF IMMUNITY IN THE HORSE. On December 20, 1894, a horse was procured for the continuation of our experiments by my colleague, Dr. H. W. Kitchen. The animal, a mare, nine years of age, and weighing about twelve hundred pounds, was sound physically, though it showed the evidence of poor care, and was unfit for road use on account of the bad condition of the forelegs. The animal had simply been worn out, so far as its travelling capacities were concerned, by overwork on the stone-paved streets of this city. Since the mare has been under the excellent care provided for her in Dr. Parker's stable she has improved wonderfully in flesh and spirits, notwithstanding the fact that she has been exposed to a gradual intoxication with the diphtheria poison.

The spots chosen for the injections were over the shoulders. An area of skin about six inches in diameter was clipped and shaved, and before each injection it was disinfected. The smaller injections were made in a single dose; the larger quantities of toxin were injected in two lots divided between the two sides. The smaller injections were made with a Koch syringe, and the larger ones were made with a small aspirating syringe, with a cut-off arrangement, by which the syringe could be filled from a bottle and the fluid then forced into the tissues of the animal.

The first injection of the original toxin was made on December 20, 1894, the day the animal arrived at its new quarters. Precisely 0.5 c.c. of the undiluted toxin was injected with a Petri syringe. The following morning the animal refused its mess of oats, and it gave an exhibition of bad temper for two or three days following

powerful germicide. The question of a non-toxic germicide is of some importance, as in the large doses (250 c.c. or more) of toxins injected into the horse considerable of the germicide is administered.

[1] Bardach (Annales de l'Institut Pasteur, Tome ix, No. 1, 1895, pp. 40–55) has just recorded some very interesting though very much prolonged experiments in the intensification of the virulence of an old diphtheria-culture. Arguing that the diphtheria-bacilli that survived the phagocytosis at the point of inoculation possessed more hardy characters than those that succumbed, he proceeded by injecting bouillon-cultures under the skin of a dog, and, after fifteen hours, recovering the bacilli from the local exudate. In this way the virulence was slowly reinforced, but it was only after *twenty-five* such passages through the dog that a high grade of virulence was established in the bacilli. In my own work I have not attempted to recover the bacilli from the seat of inoculation, but believing that those bacilli which gained access to and survived in the visceral organs were the most virulent, I have recovered them from these organs. In this way I was able, for instance, by a single passage through a guinea-pig, to make a diphtheria-bacillus that only killed a guinea-pig in fourteen days become so virulent that it killed an animal of equal weight in thirty hours, in a much smaller dose.

the injection. This was all the constitutional disturbance that could be discovered, and there was no marked elevation of pulse or temperature. Locally, however, the effects of the toxin were very marked. Within three or four hours after the injection an area of 3 or 4 cm. in diameter became swollen. This swelling increased and became indurated during the following five days, when it gradually subsided. Three days after the injection a series of blisters appeared over the swollen spot at the site of injection, and after the blisters subsided the superficial layers of the skin raised by these vesicles exfoliated. No other evidences of necrosis were discovered. This injection gave the most pronounced local reaction that we have observed.

A week following the first injection 1 c.c. of the toxin was administered. Then these quantities were injected: January 2, 1895, 2 c.c.; January 7th, 5 c.c.; January 11th, 10 c.c; January 15th, 15 c.c. (new toxin); January 19th, 30 c.c.; January 23d, 60 c.c.; January 28th, 100 c.c.; February 1st, 180 c.c.; February 5th, 250 c.c.

Thus the advance from 0.5 c.c. to 250 c.c. was made in one month and sixteen days, and but eleven injections were required to complete the immunity. The first five injections were from the original lot of toxin, which killed a guinea-pig in from forty to forty-eight hours in a dose of 0.1 c.c. The remainder of the injections were made with the more simply prepared lot of toxin, which killed guinea-pigs in from thirty to thirty-six hours in a dose of 0.1 c.c.

The effects of these injections in the horse were both local and general. Locally, the tumor that was induced by the injection of the mass of liquid under the skin persisted two or three days, and the spot felt hot and appeared to be painful when pressed upon. The injections were all made in the afternoon, and the horse usually refused its evening mess of oats, and for the first few hours after the injection of the poison stood with drooping head and ears and the dejected look of a sick animal. Usually it brightened and ate and drank well the day after a dose had been administered, though it always exhibited bad temper for a day or two after the injection, so that the attendant sometimes had trouble in entering the boxstall in which it was kept. This bad temper, which was especially directed against myself, precluded the possibility of systematically taking the animal's temperature; though there was no striking elevation of temperature or increase of pulse on the occasions when these observations were made. Twice the reactions to the toxin were unusually sharp. After the injection of 10 c.c. the local reaction was more pronounced than ordinary, the swelling was more marked and seemed more "feverish" and tender than usual. After the injection of 60 c.c. the animal appeared to be decidedly sick for two or three days. It stood perfectly still and refused its food and drink for two days. This injection was, by mistake, made deeper than usual, and I have no doubt the toxin found its way along the muscular fasciæ, as the usual local tumor of a subcutaneous injection was not apparent after this dose. Instead of this, a diffuse swelling developed and extended from the shoulder down the corresponding leg, as though the poison had infiltrated along the muscular sheaths, causing an inflammatory reaction wherever it touched. The animal seemed to suffer principally from a lameness of the right shoulder and foreleg over which the injection was made. The trouble was aggravated, I am sure, by the previously poor condition of the forelegs. As no such reaction was ever observed after any of the injections made simply under the skin, I have concluded that deep injections are objectionable, and that they will seriously delay the progress of immunity. On the whole, however, the animal's tolerance of the poison was remarkable, and, by watching the effects carefully, and pushing ahead fearlessly, the desired end was reached in a very short time and without serious mishap.

Since the maximum dose of 250 c.c. was given, the horse has received two injections. On February 12th, 150 c.c. were given, and on February 18th, 250 c.c. I shall now inject about 150 c.c. of the toxin once a week between the bleedings, and give a dose of 250 c.c. four days before a bleeding.

BLEEDING THE HORSE. On February 9th, four days after the administration of the dose of 250 c.c. of the toxins, the horse was bled for the first time. Some swelling still marked the site of the injection-tumor, but the animal was in excellent constitutional condition. At this first operation 400 c.c. of blood were obtained for purely experimental purposes.

The method of bleeding that I have adopted also varies from the directions usually given. A considerable area of skin over the location of the operation-seat is clipped and then shaved. A thorough scrubbing with green soap and water succeeds; and then the skin is disinfected by copious washing with a corrosive-sublimate solution, followed by alcohol and ether. The jugular vein is located by securing its distention with the finger of an assistant pressing upon the vein low down in the neck, then an incision is made in the direction of the vein, about midway between the head and shoulders. A careful dissection is made so as to expose the vein for an inch or two of its course. By occasionally provoking the distention of the vessel it can be more easily located in the depths of the wound. The vessel is now loosened from its surroundings and carefully drawn out of the wound with a strong, long-handled, blunt hook.[1] When everything is ready the vessel is clipped with a pair of scissors, and the flowing blood is caught in the receptacle provided. By properly manipulating the blunt hook under the vessel, the stream of blood can be guided in any desired direction; and by simply making a little traction on the hook, the flow of blood can at once be stopped. When sufficient blood has been withdrawn, a deep suture of silk is inserted so as to bring the edges of the muscles together *over* the vein; the vessel is then released, the suture tightened, and in a few moments the bleeding will all cease. Then the superficial wound is to be closed with a few silk sutures, and an antiseptic gauze dressing is applied. Of course, this operation must be performed with proper surgical precautions; and a gauze compress must always be at hand to clap over the vein in case of accident, to prevent the inspiration of air and air-embolism.

At the first bleeding some careless exploration with the unclean fingers of an untrained assistant gave us an infected wound, and a smart cellulitis with local suppuration was provoked. The second operation was per-

[1] I have employed for this purpose an ordinary uterine sound, bent at a proper angle.

formed with only a slight reaction at the site of operation.

Compared with other methods of bleeding I think this procedure has some advantages. It is less troublesome than the bleeding through a canula, and the stream of blood can be guided, and the bleeding stopped, quite as readily as with the more complicated method.[1]

The first 400 c.c. of blood were caught in a 16-ounce, wide-mouthed screw-cap jar.[1] At the second bleeding, made February 21st, about 3000 c.c. of blood were caught in seven of these 16-ounce jars. The jars were first disinfected by washing with sublimate, alcohol and ether, and then drying in a hot-air oven.

AS TO THE SEPARATION AND PRESERVATION OF THE SERUM.[1] As soon as the jarful of blood is caught, the cover is replaced, and it is set aside, undisturbed, until the whole mass of blood has firmly coagulated. This takes from one-quarter to one-half an hour. The "buffy coat," characteristic of slow coagulation in horse's blood, often appears, and this must not be mistaken for serum. As soon as the blood has firmly clotted it is transported to the laboratory. A clean spatula-blade is now carefully passed between the clot and the sides of the jar so as thoroughly to loosen the clot from top to bottom. Then the blood is set aside in a cool place. The next day a considerable quantity of clear, straw-colored serum will be found on the top and at the sides of the contracting clot. This serum must be carefully drawn off with a large (25 c.c. or 50 c.c.) pipet, and transferred to a clean vessel. During the removal of the serum the blood must not be agitated or else red blood-corpuscles will rise and spoil the serum, though they may be partially removed by the use of the centrifugal machine. On the second, third, and even on the fourth days additional quantities of good serum can be obtained from the blood, providing it is kept cool and sweet. So long as the serum remains clear, straw-colored (not red), and sweet, it is available. This serum is our *diphtheria-antitoxin*.

We now come to a matter that, while very small at first sight, is nevertheless of much importance; that is, the preservation of the serum. To read the ordinary directions for this procedure one gets the idea that all that is necessary is to add ½ per cent. of carbolic acid or ⅓ per cent. of trikresol to the serum, and its preservation is assured. "Das ausgeschiedene klare Serum wird abgeschöpft, mit 0.5 per cent. Carbol versetzt, um es haltbar zu machen und das Diphterieheilmittel ist fertig." But the desired end is not so easily reached.

The importance of proper preservation was forcibly impressed upon me recently, for I found a sample of a certain commercial antitoxic serum to be literally swarming with a variety of bacteria after a few days' stay in my laboratory.

No better culture-medium for pathogenic bacteria can be desired than this blood-serum, and, unless proper care is taken, the serum becomes the culture-ground for myriads of bacteria, almost before we are aware of a change in its character. Of course, it is possible, by the exercise of extraordinary precautions, such as filtering with bacteriologic precautions, to obtain a sterile serum which may be kept in sterilized vessels until it is wanted for clinical purposes. But even with the most rigid care it is rarely possible to obtain a germ-free serum, and, even were this possible, the serum could only be placed in the hands of a trained bacteriologist for clinical purposes. We must, then, abandon the idea of employing sterile blood-serum for practical purposes, and add to the serum some chemic substance that will safely preserve it, even when it is handled with the ordinary precautions of a physician.

The question of a suitable chemic preservative for the serum is not a matter of indifference. The agent should be (*a*) odorless; (*b*) nontoxic, even when injected in considerable doses; and (*c*) without deleterious influence on the antidotal proteid contained in the serum. The substance should be odorless, so that it will not disguise even the faintest trace of a putrefactive odor, which must at present remain our best rough test of the serum's freshness.[1] In the preparation to which I have alluded camphor was employed as a preservative, and when the fluid was first examined no trace of a putrefactive odor could be detected. It was only after the serum had been shaken vigorously that an odor like that of decayed oysters asserted itself over the odor of the camphor, although the serum was swarming with bacteria. The objection to carbolic acid and trikresol is that they may produce poisonous symptoms of their own when injected in the considerable quantities called for in large doses of the serum. Further, when these substances are added directly to the serum they precipitate some of the proteids. Used in aqueous solutions sufficient to raise the proportion of these chemicals to ⅓ or ½ per cent. a considerable dilution of the serum would be necessary.

In some preliminary experiments made with ordinary serum I encountered all of these obstacles. Besides

[1] No argument is necessary to emphasize its advantage over the method in vogue with veterinarians, in which they plunge a knife (usually dirty) deeply into the tissues of the neck, stab about until the vein is hit, and then attempt to urge the flow of blood by pressing on the vein below the cut, and by occasionally digging the knife into the wound. The blood flows everywhere except where it is wanted, trickles through the hair of the animal's neck, and stops flowing every few moments. Then the wound is closed with a couple of dirty pins, and a figure-of-8 suture of hair taken from the horse's tail completes the toilet.

[2] These jars, made by Whitall, Tatum & Co., of Philadelphia, are very well suited to the collection of blood for these purposes. They are of very convenient size and shape, and as they have no shoulders it is possible to obtain easy access to the clotted blood.

[3] I desire to emphasize the great importance of employing small vessels for collecting the blood from which the serum is to be obtained. From a considerable experience in the collection of serum from cow's blood, and from one previous experiment with horse's blood, I was never able to obtain more than from 500 to 700 c.c. of available serum from 4000 c.c. of blood, when this blood was all caught in a single large jar. At the first bleeding, however, I used a small jar, and I was surprised to find that from 400 c.c. of blood I was able to obtain 200 c.c. of good serum. Acting on this suggestion I used seven small vessels to catch the 3000 c.c. of blood of the second bleeding, and from this quantity of blood I have obtained 1700 c.c. of perfectly clear, straw-colored serum. When we remember the precious quality of this product, any method that will yield an increased quantity is of much value. I believe the advantage of this method of collection lies in the fact that the contraction of the clot can be more effective in a small mass of blood than when it is exerted on a single large mass.

[1] Camphor is used by Roux, and trikresol or chloroform by the Germans. All these workers filter the serum through unglazed porcelain.

carbolic acid and trikresol, I tried formalin, chloroform, thymol, boric acid, salicylic acid, and sodium salicylate. Formalin, even in dilute solution, preserves the serum from decomposition, but it causes the serum to become gelatinous; and then we know little about the effects of subcutaneous injection of this substance into animals. Chloroform preserves the serum well as long as it does not volatilize, but it is irritating in injections. Thymol dissolves too feebly to be useful. Boric acid does not possess sufficiently vigorous antiseptic powers. Salicylic acid, in solution with borax, was found to preserve the serum well, though it is a difficult substance to dissolve without the use of water, and water dilutes the serum. Of all the substances I have tried, I have decided upon sodium salicylate as the most eligible for the purpose. It is odorless, and its powder dissolves readily in the serum without producing a precipitate or cloudiness. Its influence in injections, in the quantities required, appears to be perfectly harmless, and we are well acquainted with the therapeutic effects of the drug. It preserves the serum well, as I have found by some very severe tests, such as keeping the serum to which it had been added in an ordinary unsterilized flask for several weeks in the air of a warm laboratory. At the end of this time the serum was perfectly clear and odorless, and a drop examined with the microscope showed no living (motile) organisms. Moreover, this substance in no way interferes with the antitoxic properties of the serum.

For the present, then, until some better substance can be recommended, I shall employ sodium salicylate as a preservative for the antitoxin. For this purpose I add 1 per cent. of the dry powder directly to the serum, and allow it to dissolve.

Even with the best of preservatives I think it highly desirable, however, to keep the serum in an ice-box until it is to be dispensed; and I would advise the physician who uses any of the products upon the market to follow religiously the direction, "keep in a cool place." As to the necessity of keeping the serum in the dark, I have, as yet, had no experience from which to speak.

TESTING THE ANTITOXIN. On February 10th the salicylated serum obtained from the first lot of blood was treated for its antidotal properties as follows:

Three large guinea-pigs, Nos. 1, 2, and 3, were each given an injection of 1 c.c. of the diphtheria-toxin, mixed with the horse's serum. The toxins here employed were of the same lot as had been injected into the horse, and two days before the test was made 0.1 c.c. of these toxins killed a 300 gram guinea-pig between the twenty-fourth and thirty-sixth hours. This tenfold fatal dose of the toxin was mixed with the antitoxin in such proportion that Pig No. 1, weighing 530 grams, received 1 c.c. of toxin and 0.5 c.c. of antitoxin. Pig No. 2, weighing 590 grams, was given 1 c.c. of the toxin and 0.25 c.c. of the serum; while Pig No. 3, weighing 625 grams, was injected with 1 c.c. of toxin and 0.1 c.c. of antitoxin. The proportions of toxin to antitoxin used in these animals were 10 to 5, 10 to 2½, and 10 to 1.

Not a trace of either local or constitutional reaction has been observed in any of these little animals. Now, eighteen days after the injections, they are all alive and well, their temperatures are normal, their nutrition is good, and not one of them shows a trace of the diphtheric cachexia that often supervenes as a late manifestation of diphtheric intoxication. As these animals have each survived ten times the usual fatal dose of a very virulent diphtheria-poison, we can only conclude that their lives have been spared and illness prevented by the antidotal influence of the horse's serum, even when employed in the proportion of one to ten. For the preliminary tests of the diphtheria-antitoxin these results are remarkably good, and they show that while our methods differed in some details from the usual ones, and while our injections of the toxins into the horse were pushed more rapidly than ordinary, the resulting immunity and the production of a powerful antitoxin were none the less perfect.

In order to complete the testing of the serum according to the European formulæ, it will be necessary to find the smallest possible amount of the serum that will protect a guinea-pig against a given amount of the toxins. According to Behring's notation, the value of a serum is expressed by the proportions that a certain dose of the toxins and a certain quantity of the antitoxin bear to the weight of the experiment-animal, the antitoxin being injected twelve hours before the toxins. Ehrlich's standard is obtained by taking as a unit one cubic centimeter of a serum that in a dose of one-tenth of a cubic centimeter will neutralize ten times the usual fatal dose of the toxins when mixed with it and injected into the animal. By neutralization is meant the complete nullification of the toxins, so that they will produce neither local nor constitutional effects. Guinea-pigs are the animals employed for these purposes.

I have not yet standardized my serum according to these formulæ. In the first place, I do not know the precise fatal minimal dose of my toxins, though I am sure it is considerably under 0.1 c.c. This test and any further tests have been suspended on account of a failure in our supply of guinea-pigs.

In reviewing the essential points in the production of the diphtheria-antitoxin let me lay stress upon:

1. The necessity of obtaining a pure culture of a highly virulent diphtheria-bacillus.

2. The fact that the toxins may be made by simply growing the bouillon-cultures of the diphtheria-bacilli in the incubator for two or three weeks, then adding ½ per cent. of trikresol, and filtering.

3. The secret of a highly potent toxin lying in the virulent characters of the organism employed.

4. The fact that the immunizing injections in the horse can be pushed more rapidly than is usually done.

5. The fact that a number of small vesselfuls of blood will yield more serum than a single large vesselful.

6. The advantages of sodium salicylate as a preservative agent for the diphtheria-antitoxin.[1]

[1] These experiments were made solely for scientific purposes, and the antitoxin is not for sale. The comparatively small quantity that we can produce will be used by us in those local cases in which a bacteriologic examination can be made. The data obtained from the use of this product on patients will ultimately be used as the basis of a clinical sequel to this report.

MEDICAL PROGRESS.

Trephining for the Relief of Hemorrhage from the Cavernous Sinus Due to Fracture of the Skull.—WATSON (*Boston Medical and Surgical Journal*, vol. cxxxii, No. 4, p. 78) has reported the case of a lad, nineteen years old, who was struck on the head by a brick thrown from a height of twenty feet. He fell, but immediately rose again, falling on his knees, however, an instant afterward. He then got up and walked across the street, and complained of pain in the right eye and above it. Consciousness was lost after an hour, and did not return until the following morning, although the patient could be roused so as to make motions with the limbs. The left pupil was dilated and did not react; the right pupil was normal. Both extremities of the right side were paretic. The knee-jerks were normal; the paralysis steadily increased, and the loss of consciousness gradually became more profound. A slight, simple depressed fracture could be felt an inch to the left of the median line, just anterior to the coronal suture. A large semicircular incision was made, and a skin-flap reflected. Hemorrhage was prevented by transfixing the base of the flap with a needle previous to the incision and compressing the base with a piece of tape passed around it and drawn tightly on the shaft of the needle. The skull was trephined over the site of fracture, and a large blood-clot found beneath the opening. The fracture extended in two radiating lines toward the base of the skull, anteriorly to the outer angle of the orbit and laterally downward toward the petrous portion of the temporal bone. On removing the clot profuse hemorrhage took place. A channel half an inch wide was rapidly cut through the bone along the anterior line of fracture toward the outer angle of the orbit, and enlarged at its lower end. A large blood-clot was then seen to occupy the whole temporal region, and to extend forward and backward beneath the base of the brain. On removing the clot the respiration, which had become slow, shallow, and irregular, at once resumed its normal character. The finger could now be swept over the orbital plate, and the line of fracture could be clearly felt extending diagonally across it to the sella turcica. From this point arose a profuse hemorrhage, which, so far as could be determined, originated at the point of junction of the ophthalmic vein and the cavernous sinus. The bleeding from this place was controlled by firm packing with iodoform-gauze. The posterior radiation of the fracture could also be clearly followed from the depression on the vertex well down toward the petrous portion of the temporal bone. From this region also a brisk hemorrhage was taking place, probably from a branch of the middle meningeal artery. This was likewise controlled by firm pressure with iodoform-gauze. The ends of the gauze were led through the lower end of the opening into the skull and through a counter-opening in the base of the skin-flap, the edges of which were united with silk sutures. The packing was not removed until the tenth day. The patient made a rapid and uninterrupted recovery. On the morning following the operation he was perfectly intelligent, and complained of no pain or other symptoms. In twenty-four days he was out of bed, and on the twenty-eighth day he was dismissed, well.

Gastro-enterostomy with Bone Plates for Pyloric Obstruction.—SINCLAIR (*British Medical Journal*, No. 1778, p. 188) has reported the case of a man, forty-three years old, who had been a dyspeptic for twenty years, and presented frequent gastric pain, relieved by vomiting. The site of pain was some three or four inches from the pylorus, but a pyloric tumor could not be made out. Weakness and emaciation increased, and the signs of dilatation of the stomach developed rapidly. Treatment was futile, and the washing out of the stomach with a syphon-tube afforded most relief. The man steadily lost strength, flesh, and color, and finally an operation was determined upon in the belief that cicatrization of an ulcer was responsible for the dilatation. On opening the abdomen, gastro-enterostomy was selected in preference to pyloroplasty, on account of the hard, cartilaginous feeling of the pylorus, and decalcified bone plates were employed. The visceral wounds were made very ample, and the plate sutures were supplemented by a row of Lembert's sutures. The stomach was incised about two-and-one-half inches from the greater curvature, and about seven inches from the pylorus. The jejunum was opened about one foot from the duodeno-jejunal junction. The intestine was doubled back upon itself before applying it to the stomach, in order to secure correspondence in the direction of the peristaltic waves in the two organs. The subsequent course of the case was uneventful. For three days nothing by the mouth was permitted, but four nutrient injections were administered daily. On the third day tea, wine, and water, and meat-juice were allowed by the mouth. By the fifth day soup, beef-tea, and white foods, and on the eighth day fish and fowl were added. On the twelfth day ordinary solid food was permitted. The patient got out of bed on the fifteenth day, and two weeks later was ready to resume his duties as a railway-engineer.

Acute Yellow Atrophy of the Liver in a Child Two Years Old.—DONKIN (*Lancet*, No. 3723, p. 28) has reported the case of a girl, two years old, who presented well-marked discoloration of the skin and conjunctivæ. It was stated that three weeks previously she had suffered with cough, constipation, sleepiness, and failure of appetite. Jaundice had been noticed for two weeks. The stools were white, and the urine deeply colored. There had also been vomiting and restlessness at night. The child appeared to be seriously ill. The liver was found to extend one finger's breadth below the costal margin, and appeared somewhat hard and smooth. The upper limit of dulness was perhaps a little lowered. No other abnormality could be detected. In the course of twenty-four hours the restlessness increased, and loss of consciousness supervened, being followed in turn by maniacal delirium. The pupils were equal and rather contracted, but reacted to light. The pulse was 120, and regular; the temperature normal. The jaundice increased in intensity, and the child became very thirsty. Petechiæ appeared on the front of the legs. Later in the day the child became quieter and drowsy, and the pupils dilated and sluggish. The temperature rose to 100° and the pulse to 140. During the night coma gradually set in. Petechiæ became more numerous and the jaundice more intense, and on the following morn-

ing the child vomited a quantity of blood and died shortly afterward.

Although a post-mortem examination could not be secured, and there was no opportunity of examining the urine for leucin and tyrosin, the diagnosis of acute yellow atrophy of the liver was thought to be amply justified.

Rhythmic Cough of Nasal Origin.—JOUROUKSCHI (*La Médecine Moderne*, 1894, No. 101, p. 1583) has reported the case of a woman who came under observation on account of persistent cough, which had been present for five-and-a-half years. At first occurring at considerable intervals, the attacks gradually recurred with greater and greater frequency, every four or five minutes, and causing great fatigue. The cough somewhat resembled the barking of a dog. In the absence of a discoverable lesion a diagnosis of hysteria was made, but despite all treatment improvement was not effected. The patient coming under observation a second time, a tumor, which proved to be a lymphadenoma, ¾ inch long and $\frac{4}{10}$ inch thick, was discovered in the naso-pharyngeal space in contact with the vomer. On removal of the neoplasm the cough permanently disappeared.

THERAPEUTIC NOTES.

The Treatment of Diphtheria with the Antitoxin.—RANKE (*Münchener medicinische Wochenschrift*, 1895, No. 8, p. 157) reports the employment of the antitoxin in the treatment of one-hundred-and-two cases of diphtheria, twenty-one having died, seventy-four recovered, and seven being at the time yet under treatment. Two of the cases were complicated by measles and eight by scarlatina, and among these there were five deaths. Of the eighty-five uncomplicated cases in which a definite result was known, there were sixteen deaths (18 per cent.). Of this number, bacteriologic examination was made in sixty-five, with positive results in sixty-four. Of the eighty-five cases of primary diphtheria, fifty-four (63 per cent.) presented on admission symptoms of laryngeal stenosis. In seventeen of these fifty-four cases the symptoms subsided after the injection of the antitoxin. In the remaining thirty-seven intubation was necessary.

The mortality from diphtheria in previous years ranged as follows: 1887, 42.2 per cent.; 1888, 43.9 per cent.; 1889, 46.5 per cent.; 1890, 47.9 per cent.; 1891, 46 per cent.; 1892, 56.2 per cent.; 1893, 46 per cent.; and in 1894, prior to the use of the antitoxic serum, 57 per cent.

HECKEL (*Ibid.*, p. 159) has reported six cases of diphtheria treated with the antitoxin, in four of which peptonuria was observed.

Radical Cure for Chronic Dysentery of Recurrent Type.—At the recent Indian Medical Congress GALLAY (*British Medical Journal*, No. 1779, p. 276) related eight cases of chronic dysentery of recurrent type to illustrate the curative effects of large enemata of a solution of crystallized silver nitrate in distilled water, a scruple to a quart. The patient is placed on his right side with the left thigh bent; an enema of tepid water is given first, and when this has acted the solution of silver nitrate, to which from 20 to 30 drops of laudanum have been added, is thrown up. The patient tries to retain it for a few minutes, two, three, or five minutes being the maximum; sometimes it is evacuated in two efforts, the second evacuation being separated from the first by a few hours' interval. The only immediate ordinary consequence of the washing is a sensation of stricture at the lower part of the rectum, which passes away after a quarter of an hour at most. Often from the first washing the amelioration is complete, but at any rate it can be relied upon to follow the third or fourth washing. To secure, however, permanent relief, it is necessary to continue the treatment, and a course of sixty washings is recommended.

Salipyrin for Metrorrhagia.—ORTHMANN (*Berliner klinische Wochenschrift*, 1895, No 7, p. 145) has employed salipyrin in the treatment of fifty cases presenting metrorrhagia from various causes. The drug was given in the form of pastilles, each containing fifteen grains, and one of which was taken thrice daily. When possible, the administration was begun a day or two before the anticipated hemorrhage, and continued through the entire course of bleeding. The total amount given in individual cases varied between three-hundred grains and two-and-a-half ounces. In no case were unpleasant results noted. Forty-five of the cases were under observation for from three-quarters of a year to a year-and-a-half, and from thirty-two exact personal reports were obtained and final examinations made. In twelve of these no satisfactory result at all was obtained. In twelve there was distinct improvement, and in the remaining eight the result could be designated good. The best results obtained were in cases of metrorrhagia following labor or abortion.

The Chlorin-quinin Solution of J. Burney Yeo, for the treatment of typhoid fever, referred to in an article by Dr. Emil King in THE NEWS of March 2d, is made as follows: Thirty grains of powdered potassic chlorate are put in a twelve-ounce bottle and sixty minims of strong hydrochloric acid added. A greenish-yellow gas is at once liberated. The bottle is well-stopped and its contents agitated until the bottle is filled with gas. Then water is added, little by little, closing the bottle and shaking it well at each addition, until the bottle is filled.

In twelve ounces of this solution from twenty-four to thirty-six grains of quinin are dissolved, and syrup of orange-peel is added to give an agreeable flavor. The dose is an ounce every two, three, or four hours, according to the severity of the case.

The Sero-therapy of Tuberculosis.—At a recent meeting of the St. Louis Medical Society PAQUIN (*Medical Review*, 1895, No. 8, p. 147) reported a number of cases of tuberculosis treated by injections of blood-serum of horses rendered immune to the disease. The method of preparation was withheld. The serum was administered in does of from ten to one-hundred-and-fifty drops once daily. Among fifteen-hundred injections but two abscesses formed.

THE MEDICAL NEWS.

A WEEKLY JOURNAL

OF MEDICAL SCIENCE.

COMMUNICATIONS are invited from all parts of the world. Original articles contributed exclusively to THE MEDICAL NEWS will upon publication be liberally paid for, or 250 reprints will be furnished instead of payment. When necessary to elucidate the text, illustrations will be provided without cost to the author.

Address the Editor: GEO. M. GOULD, M.D.,
1004 WALNUT STREET,
PHILADELPHIA.

Subscription Price, including postage in U. S. and Canada.

PER ANNUM, IN ADVANCE $4.00
SINGLE COPIES 10
WITH THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, PER ANNUM . . . 7.50

Subscriptions may begin at any date. The safest mode of remittance is by bank check or postal money order, drawn to the order of the undersigned. When neither is accessible, remittances may be made, at the risk of the publishers, by forwarding in *registered* letters.

Address, LEA BROTHERS & CO.,
Nos. 706 & 708 SANSOM STREET,
PHILADELPHIA.

SATURDAY, MARCH 16, 1895.

"ATHLETICS."

THERE has been found one medical journal to espouse the cause of what is passing nowadays under the name of athletics, and we are implored to consider the logic brought forth by a professorial contributor. We have examined the argument as presented by PROFESSOR RICHARDS in the March number of the *Yale Medical Review*, and find it exactly like all previous arguments in favor of foot-ball. It is just as guilty of unwarrantable assumptions of premises, of inconsequential conclusions, just as cunning in ignoring and misstating, just as biased and one-sided as have been all the previous pleas. It is exactly like the argument of a cheap lawyer bound to free his client at all costs. Every old hack statement brought out to bolster up the ruined cause has been repeatedly knocked into smithereens, except, perhaps, that remarkable one about the rise of cities and the growth of athletics, and every telling fact against the author's cause is ignored or minimized. There is nothing more damnatory of the foot-ball craze than such disingenuous arguments and such illogical fustian by supposed logicians. The shrewder men, like Brer Rabbit, recognize that it is better to "lay low and say nuffin," hoping that the storm will "blow over." We are glad to believe that both the silently sly and the schoolboyishly logical are each equally poor judges of public opinion. The public is quite as likely to follow the leading of President ELIOT as of the professor who stigmatizes him as no longer "able to look at more than one side of the subject." We therefore trust that the defenders of foot-ball will continue their defences. Every attempt is an added nail in the coffin of their cause.

We turn with the greatest relief and pleasure from such tricksiness to the straight-out ingenuousness of a blabber of the whole secret. In *The Peterson Magazine* for March, 1895, there is an article that, like an *enfant terrible*, blurts out the whole truth, without sentimental nonsense, moral whine, or patriotic jingoism. DR. ADAMS, in speaking of the progress lately shown by a great Eastern college, says:

> The victories of our foot-ball team in the past few years have undoubtedly been worth more to the institution than an endowment fund of $1,000,000. This may seem at first thought an extravagant statement, but let us stop to consider it. The interest on $1,000,000 is $50,000 a year. This is balanced by the various elements set to work by the enthusiasm created by these victories. In the first place, on the purely financial side, the increased interest in athletics for the past few years has resulted in the building of a $100,000 athletic field. But it has done far more than this: it has paved the way to a more brilliant future for the university; it has attracted the attention and admiration of thousands of growing boys in whose hands to a certain extent is left the choosing of their college for future study. This means that hundreds of boys who might have gone to Harvard, Yale, or Princeton, and whose brothers did go, are now seriously debating the question of remaining in Philadelphia to complete their education. It may seem hard lines that a great educational institution must depend on its success in athletic fields for a proportion of its students, but such is the case, and the college authorities have long since wakened to the truth. It is due to the fact that the American student is generally able to persuade his parents to send him to the college of his choice.
>
> Again, the interest of the public is aroused in the institution by these recent successes, and, having it in their minds, many persons charitably disposed are far more likely to remember it pecuniarily. Then it has hastened the growth of the "university spirit," as will be spoken of more at length later in this article. Again, the fame of the university has spread to many circles and to many regions where it was hitherto but little known. Its affairs attract as much attention now as do the matters concerning the other great universities, a national interest in its affairs having been established. These various influences, aroused or stimulated recently, are worth far

more to the university than $50,000 a year, for they mean growth and activity for increased efforts. This is encouraging, etc.

This refreshing and frank truthfulness, however, suggests many inquiries, among them the following:

1. For what were universities of learning founded?

2. Is it any great advantage to the community or to learning to have students drawn from one college to another?

3. Is the boy the best judge of what constitutes the best institution of learning, and of what are the best educational methods?

4. What about the dignity of advertising an institution of learning by semi-professional "athletic" shows?

5. What will be done with the students stolen from other colleges when they are secured?

6. If foot-ball is far and away the saver of the race, why prepare but a single $100,000 athletic field? Several thousand students will require hundreds of such fields in order to permit all students to acquire the "intellect,"[1] the "morality," the "obedience,"[2] and the muscle requisite in life, and, according to foot-ball logicians, obtainable only by means of foot-ball.

7. Is the "university spirit" so glorious when it results in such a bitter rivalry as to-day exists between Princeton and Pennsylvania, and when it forces one of these colleges to demand a truce of hostilities for a year, in order, *as it is said*, to let the boys "cool off"?

Just as the greatest crimes against religion and freedom are committed in the name of religion and freedom, so the greatest crimes against education are those by professional educators, and also, we may add, the greatest crimes against athletics are perpetrated in the name of athletics. In a certain sense the medical profession is the guardian of the health of the community. It, therefore, becomes the duty of every medical man to protest against the abomination of the proprietors of university shows carrying on their business of college-advertising in the name of physiology and hygiene. There is plainly creeping through the popular mind a sneerful suspicion of the very word athletics. It is a poor booby that cannot see that, *e. g.*, golf, or base-ball, has every advantage claimed for foot-ball, and is without almost every one of its disadvantages. The name athletics is becoming scorned, and by the subtle law that governs the changes in the meanings of words is being changed into a term of reproach. With the debauchery of the thing there quickly follows the contempt of the word, and genuine athletics will, by reaction and revulsion, become detested, just as the contemptibleness of the dispensary-abuse is preparing a sentiment that will end in the starvation of legitimate medical charities.

Nowhere is this manifest more plainly than in the rise and luxuriant growth of pugilism and of "athletic" clubs. All over the land in every city there are many, sometimes with one or more thousands of members. In almost every town of any size there is at least one so-called athletic club, the attractions of which consist of almost nightly prize-fights, euphoniously called glove-contests, sparring or boxing matches, not of the members, but of hired professionals. These two subvarieties of athletics, prize-fighting and foot-ball, give nine-tenths of the popular interest in "athletics," and in a little while the word will connote these things principally or alone.

What we wish to make clear is that neither sparring nor foot-balling, as at present carried on, can be legitimately called athletics—and simply because the spectators who are as one-hundred or as one-thousand to one, indulge in no athletics except the laryngologic type. They sit (or stand) and watch the hired men do the athletics. It would be as true to call a theater full of people a school of dramatic art for the spectators. One may see acting or athletic contests all one's life and never become an actor or an athlete.

When we get educators who care either for education or for genuine athletics we shall have something quite different from the present intercollegiate advertising-show variety. Then will physical exercise be subordinated to mental exercise, brawn to brain, and athletics to erudition; then ALL of the students will be encouraged to develop the body in rational

[1] The famous Yale "Lit." prize was not awarded this year because not one of the essays handed in was deemed worthy of any recognition.

[2] The *New York Herald* of February 24th contains a column-long account of the attempt of the students of Princeton, "among whom were several members of the University foot-ball team," to break up an entertainment of the townsmen given in Odd Fellows' Hall. A fight followed "with beer-bottles, baseball-bats, and fence-pickets, as well as fists;" the "students" were finally whipped. In the same issue of the *Herald* is an account of "a lively battle" at the Bloomington (Indiana) College in which "'Sophs' were taken from their beds and tied to trees, and a student's skull fractured." These things happened about the day Professor Richards was writing that foot-ball had stopped the old practice of hazing.

and non-injurious ways. We shall then not be witnesses of the disgrace of professional educators egging on the mob of non-athletic thousands to cheer the dozen or two of the show team put in conflict to advertise their college, and to attract students and endowments.

THE TREATMENT OF EXTRA-DURAL HEMORRHAGE BY TEMPORARY RESECTION OF THE SKULL.

CURRENT medical literature teems with reports of successful intracranial surgery, and abstracts from a considerable number of important operations have recently found place in the Progress department of THE MEDICAL NEWS. As we have already taken occasion to say—in part directly, and in part by implication—the surgery of the brain and the brain-case differs only from the surgery of other parts of the body in the anatomic and topographic relations of the structures, in conjunction with the difficulties of diagnosis. The application of this generalization—in fact, its very promulgation—is but one of many advances made possible by antiseptic and aseptic surgery. When the diagnosis is reasonably clear the surgeon now has almost as little hesitancy in opening the skull for the evacuation of a purulent accumulation, the removal of a neoplasm, or the control of hemorrhage, as if any of these occurred in less vital or deep-seated parts, and the success of such intervention has fully justified the boldness of the undertaking. With growing operative skill, improved technique, increased precision in diagnosis, and maturer surgical judgment, many lives must in future be saved and much suffering averted by a timely application of the principles evolved out of a fuller and riper experience in the treatment of intracranial diseases.

In a recent communication WAGNER (*Berliner klinische Wochenschrift*, 1895, No. 7, p. 137) directs renewed attention to a mode of operating on the calvarium for the relief of intracranial conditions described by him a number of years ago under the designation of temporary resection of the skull, and since by others as osteoplastic resection or trephining, and reports two cases of hemorrhage between the dura and the bone in which the procedure was successfuly carried out, the hemorrhage controlled, and recovery ensued. In both a fracture at the base of the skull ensued from indirect violence, and a hematoma of the dura mater formed in the middle fossa, resulting in the one from a laceration of both branches of the middle meningeal artery and in the other from a laceration of the anterior branch and of the transverse sinus. The diagnosis was arrived at from the presence of typical symptoms of progressive pressure upon the brain, preceded by a characteristic so-called free interval, separating the stage of concussion, without hemorrhage, from that of the actual extravasation of blood.

In the stage of shock the pulse is usually small and frequent, but with the increase in brain-pressure it becomes slow, harder, more tense, and often irregular. As a rule, paralysis of the opposite side of the body appears, indicating that the extravasation is beginning to exert pressure upon the motor area. Convulsions are of frequent occurrence, and may be ascribed to anemia of the medulla oblongata.

The only remedial measure under these conditions is the evacuation of the extravasated blood and the control of further hemorrhage. This should be undertaken as soon as symptoms of pressure make their appearance, as manifested by somnolence and paralysis. In the absence of definite knowledge as to the source of hemorrhage it is perhaps best to remove a flap of bone from the skull in the angle formed by the intersection of a line passing horizontally two-fingers' breadth above the malar bone by another passing vertically a thumb's breadth behind the ascending process of the same bone. Should the bleeding not be accessible from this situation, the opening in the skull can be enlarged. In case the source of hemorrhage cannot be found the wound may be packed and the flap of bone temporarily replaced. At a later day the packing can be removed and the wound leisurely inspected.

A further advantage of the large opening thus permitted is the ease with which a copious extravasation can be evacuated. The use of the mallet and chisel is well adapted to the performance of the operation.

EDITORIAL COMMENTS.

The Cleveland Medical Society, the Code of Ethics, and Sectarian Affiliation.—At a recent meeting of the Cleveland Medical Society the following preamble and resolution were presented, and, after some discussion, adopted:

"WHEREAS, The Constitution and By-Laws of the Cleveland Medical Society provide that any legal medical practitioner is eligible to membership in said Society; and

"WHEREAS, At the last meeting the amendment which was proposed to make the Constitution and By-Laws of said Cleveland Medical Society conform to the Constitution, By-Laws, and Code of Ethics of the

American Medical Association was rejected and laid on the table:

"*Resolved*, That the active membership of said Cleveland Medical Society shall be open to any legal practitioner of this city, no distinction being made in regard to the school of medicine to which said legal practitioner may belong."

The contention was made that the resolution was in conflict with the present Constitution of the Society, which permitted only regular physicians to become members. This difficulty was, however, overcome by the adoption of a motion that the word "regular" be so construed as to mean any legally qualified practitioner of medicine.

We can scarcely congratulate the Cleveland Society upon its action in this matter, for we are unable to see how good can come of affiliation with practisers of sectarian medicine. If honest and sincere in their practice, they must be wrong in philosophy; if dishonest and insincere, wrong in morals. How any reputable regular physician can meet such men professionally, on terms of equality, and to the advantage of the patient, we fail to comprehend. Now, as ever, oil and water will not mix.

While we agree with our excellent contemporary, the *Western Reserve Medical Journal*, that a code does not make gentlemen of those who are not already such, it must be remembered that neither code nor law is needed for the good people of any community. It is for those "upon the fence," as well as the outright bad, for whom restrictive legislation is necessary. As things go, there are a certain number of men, both without and within the medical profession, who require just such restraint as is exerted by the enactment of salutary laws upon the one hand and of an ethical code upon the other. If it were true that "no gentleman in our profession will knowingly consort professionally with a man of evil practices and dishonorable methods, nor will he call in consultation a man inferior to himself in knowledge and experience," there would in reality be no need of a code. Just as true is it that if there were no criminals there would be no need of preventive or reformatory laws. Besides, what course will the "superior" regular pursue when asked to consult with an "inferior" sectarian? It is, further, perhaps, "nobody else's business with whom a man consults," but frail humanity ordinarily judges individuals by their associates and their associations.

The New York State Board of Medical Examiners.—The State Board of Medical Examiners representing the Medical Society of the State of New York has made a report of its work for the year 1894, which contains a number of interesting data. The total number of candidates actually examined was 536. Of these, 470 were examined by the Board representing the Medical Society of the State of New York; 59 by the Board representing the Homeopathic State Medical Society; and 7 by the Board representing the Eclectic Medical Society of the State of New York. Of the first, 316 passed, and 32.7 per cent. were rejected. Of the second, 46 passed, and 22 per cent. were rejected. Of the third, 3 passed, and 57.1 per cent. were rejected. Seventeen candidates were rejected a second time; 6, three or more times; and 54 were unable to secure a license.

It appeared that, whereas prior to 1891 the number of physicians locating in the State of New York was from 700 to 800, there are at present less than 400. The fact, however, that there were 536 applicants is accounted for not only by an increase in the number of medical men, but principally by the fact that the State license has become a matter of such importance that most of the States having boards of medical examiners accept them as licenses to practise, without exacting added medical tests. Under the provisions of the law the Board of Medical Examiners is permitted to indorse as sufficient to practise the licenses issued by other State boards of medical examiners, provided the standards of these boards are not lower than those of the New York Board. Numerous applications from various States were received for this indorsement, but on investigation it was found in each instance that the standard was not sufficiently high to warrant approval of the documents submitted. The Board complains that the preliminary education of medical students and candidates for the licensing degree in the State of New York is not satisfactory. It finds that while the standard is far above that established in other States it is still insufficient and not on a par with the requirements exacted from students of other professions in the State. In accordance with this opinion the Board adopted a resolution declaring that the best interests of the public and of the medical profession would be materially advanced by gradually increasing the minimum requirements as to general preliminary education until no candidate be entitled to matriculate in 1897 at a degree-granting medical school who shall not have completed at least a full high-school course. The public may well congratulate itself upon the outcome of the agitation directed to its welfare and interest instituted and carried to a successful issue by the medical profession.

Dr. Daniel Hack Tuke.—The death of this eminent alienist is announced in the cable dispatches from England. Dr. Tuke was a grandson of William Tuke, the founder of the York Retreat, the celebrated Friends' Asylum, in which, for the first time in Great Britain, rational and humane methods were employed in the treatment of the insane. He was educated at St. Bartholomew's Hospital, where he was a fellow-student with that distinguished Friend and ornament to our profession, Mr. Jonathan Hutchinson. For a time Dr. Tuke was Resident Physician at the York Retreat, but a progressing lung-trouble interrupted his professional work for many years, during which he lived at Falmouth. He kept close touch, however, with his special work, and issued in this period, with Dr. Bucknill, the well-known *Manual of Psychological Medicine*, and the *Influence of the Mind Upon the Body*, both of which were reprinted in this country.

Early in the seventies his health was so far established that he removed to London, where for twenty years he has been an active worker in promoting the best interests of psychology. For many years he was joint editor of the *Journal of Mental Science*, and he has year by year issued many valuable monographs, such as *Insanity in Ancient and Modern Life*, 1878; *Chapters in the History of the Insane in the British Isles*, 1882; *Sleep-Walking and Hypnotism*, 1884. In 1892 appeared the *Dictionary of Psychological Medicine*, which he edited with great

skill and care. In 1884 Dr. Tuke visited the United States and Canada, and made a systematic inspection of the asylums of both countries. The results of his visit appeared in a work entitled *The Insane in the United States and Canada*, 1885. He entertained for this country that warm feeling which characterizes so many of the members of the Society of Friends in England, and while here he made himself very popular, and left behind most pleasant memories. He had, in truth, a loving and gentle spirit, zealous ever for the good of his afflicted brethren, zealous always for the honor of the profession. His life affords a noble example of splendid work accomplished under the adverse circumstances of ill-health; and his name will be written (with those of his father and grandfather) among the Abou-Ben-Adhems—those ministers of God to men, who have "in much patience, in affliction, in necessities, in distresses," labored to lighten the heaviest burden of a heavily burdened humanity.

Defective Eyesight and Color-blindness in the Mercantile Marine.—Perhaps even more so than that railway-engineers and other employés on railroads should be free from defects of vision, and especially color-blindness, is it essential that the officers and men on board ship should possess such freedom from imperfect eyesight. Systematic effort is making in England to attain such a desirable state of affairs, and should find ready imitation in all civilized countries. It appears that in the year 1852 the Liverpool Board of Trade issued an order compelling vessels at sea to carry at night bright and colored lights, so as to indicate their position to other and passing vessels. A few years later attention was called to the fact that accidents could not be prevented by this means if the sailors were poor-sighted or color-blind; but a long time elapsed before practical notice was taken of this important observation. It was not until 1877 that the Liverpool Board of Trade promulgated rules and regulations dealing with this question, and new tests were issued to masters and mates in the mercantile marine in 1894. Carried out by competent medical examiners, these tests are in themselves satisfactory; but their usefulness is neutralized by the fact that they become compulsory only when a man enters for a second mate's certificate, instead of when he begins his career as a sailor. The evils of this course are (1) that defective vision and color-blindness may exist in all men in the mercantile marine below the rank of second mate; and (2) that such men, after having spent many years in preliminary work, find themselves cut off from advancement by reason of the discovery of their defect. The remedies proposed are that no one should be allowed to enter the mercantile marine who is not shown by adequate tests to be free from defects of vision, more particularly as regards form and color, and that every navigating sailor should, on going to sea, be compelled to possess and display a certificate of good vision. Other employment should, as far as possible, be provided for those already in the service who happen to suffer from serious defects of vision.

The Children's Aid Society of Pennsylvania.—We cannot forbear again calling attention to the splendid work being done by the Children's Aid Society of Pennsylvania. The work of this organization is not pursued upon conventional lines; the Society has not founded a "home" in which it cares for large numbers of children. On the contrary, its object is the placing of children who have no one else to care for them with families willing to look after them. In the past the Society has, from want of adequate means, found homes for these children in families willing to keep them without remuneration, but experience has taught that better results are attained by an arrangement in conformity with which a certain amount of board is paid for each child, and whose supervision is continued by the Society. The work has already been so well organized that the number of applications for children is in excess of the means of the Society for their disposition. The advantages of the plan seem so obvious as scarcely to justify elaboration. These unfortunates are thus at once removed from influences likely to react unfavorably upon their moral, mental, and physical development, and placed amid others calculated to exercise the opposite effect. Useful citizens are made of those that, uncared for, might go to swell the criminal and defective classes.

The Society has had under its care, during the year 1894, 598 children, of which number, 104 passed from under its care. In addition, 466 women, each having one child, were rendered self-supporting by being placed at service. The Western Soup Society has fitted up a part of a commodious house for the use of these homeless mothers with children, with the object of inducing the mothers to keep their children with them, rather than to surrender them into the care of others. Good places are found for these in families that are willing to take a mother with her infant into their employ at low wages. Temporary lodging, while awaiting situations, is given by the Soup Society, the cost of board being deducted from their wages after the women are placed at service.

The work of the Society is distinctly humanitarian and deserving of the warmest encouragement and support. Charles E. Peterson, 321 South Twelfth Street, is the Treasurer, and will be glad to receive contributions.

More Play-grounds for Children.—The Board of Education of Philadelphia contemplates the opening of school-yards after school-hours, so that children may use them for play-grounds. There is no reason why the brick pavements in such yards should not be removed in order to prevent broken limbs and other accidents which are liable to occur when children are obliged to play in such paved yards.

The movement for breathing-spaces, city parks, and children's play-grounds should receive all encouragement. The majority of children must remain in the city during summer, and the trolleyed streets and filthy courts and alleys are not fit for children to play in.

SOCIETY PROCEEDINGS.

PHILADELPHIA COUNTY MEDICAL SOCIETY.

Meeting held January 23, 1895.

"Heredity in Insanity" was the title of a paper by DR. ROBERT H. CHASE. It was pointed out that the most common of all diseases is insanity, and the most common cause of insanity is heredity. In no class of disease is the transmission of a predisposition to ill-health

more potent or more evident than in insanity. This fact renders the subject one of the most important in the range of medical science.

The reasons for this great phenomenon are not hard to find or difficult to understand. If the mental and physical traits were not transmissible, then there would be an end to all training and all development. As one writer aptly puts it:

"If the child did not inherit the result of all that had gone before, with additional power of development on his own part, all social growth would be rendered impossible. The torch of civilization is handed from father to son, and, as with the idiosyncrasies of mind, so the very body itself exhibits well-defined marks of its parentage."

Thus it is undoubtedly that there is a great fundamental law of nature that the attributes of the parent descend to the child. This seems to be particularly true of the failings, the defects, the infirmities of the parent.

There have been opponents to this proposition, particularly as regards the hereditary character of insanity. Dr. Bucknill has thrown doubts upon the importance of inheritance and has said that if insanity be so easily transmitted from parent to child, how is it that so many in a family escape? The reply to this argument sweeps it away entirely. First, it is a well-known fact that a new generation may escape entirely, or to a large extent, the mental taint of their progenitors; but who can be certain that the taint is actually absent and not held in abeyance? Second, the study of hereditary transmission of various parental peculiarities shows that heredity is prone to select only certain individuals in a family; take, for example, the peculiarity of the presence of an extra finger or toe. This anomaly may run for many years in a family, selecting only a few individuals, or even one alone in a generation. Third, the more obscure fact in the law of heredity that a tendency may be transmitted from one generation to the third through a second generation which may show no development in the person transmitting it. One of the most beautiful illustrations that we have of this freak of nature is seen in hemophilia, a daughter who is not a bleeder transmitting the tendency to bleed from her father to her son.

When we become better acquainted with this subject of heredity doubtless we shall find that there are well-defined principles by which mental taint is transmitted; already we know that heredity in insanity follows, to a great extent, certain definite tendencies. In this manner insanity may be transmitted directly as far as kind goes, so that the hypochondriacal parent may have a hypochondriacal child, although frequently the inheritance may be altered in form, as a maniacal parent having a melancholic or epileptic child. Another proneness of inheritance seems to be the transmission of the tendency to take on disease under similar conditions, such as age or childbirth. Thus, one family inheritance is a tendency to pass into a state of weakmindedness with melancholy at a certain period of life. Likewise, instances are recorded in which mother and daughter have suffered from puerperal insanity.

In taking up the subject of heredity in insanity in as scientific a manner as our present data will allow, it is well to define exactly what we mean by the term. By heredity, in mental pathology, we mean an original predisposition to mental alienation transmitted to children from their parents.

This definition becomes necessary when we come to study the frequency of the transmission of insanity, for different observers vary in their figures, as a result, we shall find, largely of their variance in the definition of heredity. For example, Marcè claims that we find some antecedent taint in nine-tenths of all cases; Esquirol, on the other hand, found this predisposing cause in one-fourth of 1375 patients whose histories he examined. Figures of other observers vary between these extremes, in consequence undoubtedly of the latitude allowed by the different observers in their search for previous cases of insanity in the families of the patients so afflicted. Those observers whose percentages run very high have included almost any connection by blood, while those whose percentages are lower have limited their examinations to direct ancestors, as parents, grandparents, and great-grandparents. In this dispute the medium course in estimating the number of patients whose insanity is due to inheritance is the safer one. On examining the figures of all the various observers, it is a modest estimate to say that the figures vary between 40 and 60 per cent.

There is a nomenclature in the study of this subject which it is necessary to comprehend to follow it intelligently. Heredity, when it is attributed to parents, is *immediate;* when it is traced from grandparents, having skipped the parents, it is *mediate*. When it has existed for many prior generations it is called *cumulative*. It may be on the side of both parents, in which case it is called *double*, or *from convergent factors*. When it is derived from one parent it is *simple*, either paternal or maternal. According to Esquirol, the latter is the more serious form of the two; it is also three times the more common.

When hereditary insanity appears in the child at the time that it appeared in the parent it is called *homochronous*. When it appears in children before it is seen in the parent it is called *anticipatory*. When the hereditary taint reveals itself by a mental disorder identical with that of the parent it is called *homologous;* when it is modified in passing from one generation to another it is called *dissimilar*, or *transformed*. When it becomes more and more intensified by transmission it is said to be *progressive;* if it is alleviated by a series of fortunate crossings, it is *regressive*.

The forms of mental alienation that are more predisposed to transmission are undoubtedly suicidal, reasoning, and the several forms of periodic insanity; while acute mania and melancholia compromise the family to a much less degree. In pursuance of this subject Dr. Règis' recent work is interesting. This observer has taken up the biologic features of insane families and has developed the theory that heredity in mental alienation presents itself under three morbid types, with clearly defined characteristics:

1. The neurotic, or neuropathic type, which originates in the neuroses and gives rise to neuroses and neuropathic insanities.

2. The cerebral or congestive type, originating in cerebral disorders and giving rise to cerebral affections, complicated, it may be, with insanity.

3. The vesanic type, originating in pure insanities, giving rise also to pure insanities, or vesania.

The special evolution of each of these hereditary types, according to this authority, permits to a certain extent the foretelling to what category of mental disorders the members of a family are particularly disposed. Thus, for example, general paresis does not arise from insanity and does not engender insanity. Like the cerebral diseases, it is born of cerebral affections, and gives rise to the same. It follows that as general paralytics are not descendants of the insane, and do not produce the same, their children escape vesanic heredity; and if they are doomed to any special class of disease by reason of the general paralysis of a parent, it is evidently not to insanity but to cerebral affections of all kinds. Although the biologic study of the family history of the insane of these various types has but recently been touched upon by observers, yet this field is rapidly widening, and it is probable that the day is coming when it will be possible for a physician to formulate in cases of hereditary predisposition scientific rational opinions, not merely a response empiric, so to speak, made solely to reassure the interested parties.

The prognosis when there is a hereditary predisposition to insanity is unfavorable as to permanent recovery; although it may render the likelihood of a primary recovery more probable, yet the possibility of a permanent cure is less probable. Curiously enough, some observers have claimed a higher percentage of recoveries in hereditary cases than in non-hereditary cases —in the table of the Crichton cases, in which in a large number reported the percentage of recoveries in hereditary cases was 36 per cent. to 32 per cent. in the non-hereditary. But the great mass of statistics exhibit the opposite result. Krafft-Ebing has demonstrated the fact that in cases of hereditary disease that were marked by sudden explosions of insanity the prognosis was favorable, while in those that were characterized by a long incubation it was unfavorable. The Crichton cases happened probably to contain a large percentage of the former class. The great tendency of hereditary insanity is to relapse. The diagnostic value of a hereditary tendency to insanity depends largely on its degree. Thus the insanity of one parent would indicate a less degree of predisposition than that of one parent and an uncle, or still less than that of a parent and a grandparent, or of both parents. Again, the insanity of a parent and a grandparent, together with that of an uncle or an aunt in the same line, may be held to indicate a stronger predisposition than even the insanity of both parents.

The significance of the insanity of parents will depend to a large extent upon the period of its onset. The insanity of a parent occurring after the birth of a child, if it arose from a cause adequate to excite it without previous predisposition, would be held, of course, as of no value in the formation of a hereditary tendency.

The insanity of relatives more remote than parents, uncles and aunts, brothers and sisters and first cousins, is not worth anything except in corroboration of nearer and weightier facts. But the influence of other related diseases to insanity occurring in those near akin, such as eccentricity, alcoholism, epilepsy, hysteria, hypochondriasis, vicious or criminal tendencies, etc., may be of great import.

It will thus be seen that the evidence of hereditary predisposition may be of such a character as to render insanity in a patient an event in the highest degree probable; or, on the other hand, it may be so weak as to add a scarcely appreciable amount of probability to the character of the disease.

The treatment of heredity in insanity is, after all, the most important, because the most practical side of the question. Of course, the most decisive way to treat this subject would be to stamp it out by forbidding the marriage of persons so tainted, but unfortunately, as in our syphilitic and tuberculous cases, this is impossible; so our efforts must be directed to preventing the appearance of insanity in such cases, or, if impossible, to ameliorating its condition when it appears. In children of such parents, method, patience, persistent command of temper, self-denying industry, and much knowledge of child-nature are necessary. As to choice between home and school treatment, it is impossible to decide in all cases off-hand. Some do better at home, some do better at school; few will do well at home, however, when it is impossible to be strict without being stern, or to carry out the necessary discipline without setting aside the claims of natural affection. The selection of the proper person to carry out these plans of discipline is by far the most important factor in the early history of the case.

Again, a sound mind needs a sound body; and exercise, food, and raiment exert marked control over the health of these children. Their lives must be a happy medium between the Scylla of over-exertion, over-discipline, over-study, and the Charybdis of the antithesis of these factors.

When the child has become the man, or at least when he comes to be his own master, then is the time of greatest trial. The physical and moral storm of puberty must be encountered, and great temptations have to be met with less guidance. When the outbreak is imminent the problem arises: Should the youth or the man continue or stop his regular occupation? This is a question that cannot be answered without a study of the individual case. In some instances it is better for the patient to do this; in some worse. The only general rule to follow is that if the calling is attended with anxieties that weigh upon the ailing mind, it should either be given up for a time or its burden should be lightened.

Should the threatened patient travel? This is an easy solution of the problem and an error often into which many physicians fall; it is so easy to order the patient away, that it is adopted with more frequency than wisdom. Change of scene may do good, but constant change of scene, with its labors, vexations, and trials, especially in a foreign country, may do much harm. A threatened case of insanity should not be sent to travel without guarantee that proper care and efficient watch will be provided for him. Travel should include due provision for care and protection, the right admixture of rest and fatigue, change and repose. Under these circumstances it may be a very fair thing to try.

DR. MARTIN W. BARR next read a paper on "The Influence of Heredity on Idiocy." Throughout the history of education and of medicine no point has so engaged the attention of the philosopher and the scientist as the influences of environment and heredity. These influences upon our physical being, repeated through successive generations, resolve themselves into

a law, a law as unalterable as that of the Medes and Persians—a law founded upon fundamental truths and verified in the experiments of physiologic science.

The aim of educational and medical science is one, viz., to secure to the individual a sound mind in a sound body, so that all that touches one must find its prototype in the other. In this more than aught else, if one member suffer, all the members suffer with it.

This law of balance and proportion we recognize in the forces of Nature, in the applied arts and sciences, and we are quick to note the evil effect of the least deviation from this rule.

In a nature so complex as man's—a mechanism so finely ordered—none can deny that the same principle is but intensified.

Here, therefore, in natural sequence, the *psychologic* follows the *physiologic* research, nay, rather joins hands in this effort to restore health to the mind or to prevent degeneration; and, acknowledging the sins of the father transmitted in the *body* to the third and fourth generations, would fain seek in the springs of life itself the influence of heredity upon the mind—the secret and causes of idiocy. Most arrogantly we call ourselves "the heirs of all the ages" in all good gifts, but we are slow to acknowledge the serpent's trail in our Eden. Our vanity is sensitive, and recoils naturally from the thought of blemish in our own—physical or mental—an ancestry, either ignoble or unfortunate. We do not, and we will not, except under protest, receive the law of heredity of ill.

Convinced that it is logical, still we seek proof in statistics. The gathering of statistics under these circumstances is difficult. Parents and friends are loath to accept such evidence, and, actuated by false shame, still more loath to impart information, especially when there is a neurotic taint. The physician, in many cases, feeling that he is betraying a confidence, keeps no record, and the literature on the subject is, therefore, most meager. Thus, when we begin to sift the matter as we should like, we are frequently unable to verify our conclusions. So in many cases the causes of idiocy remain unexplained, closeted within the secret recesses of nature.

But the field of research, with all its difficulties, is broad and is practically unexplored. Before going into statistics, however, let us consider, for a brief space, opinions of deep thinkers on this subject.

Mercier says: "The first and most fundamental law of heredity is that *every attribute of the parents tends to be inherited by the offspring*. Inheritance is the law, non-inheritance the exception." It will be observed that he does not say they *are*, but that they *tend* to be inherited, and the question therefore resolves itself into this, either the offspring does or does not resemble its ancestors. If the former, then there is an hereditary law; if the latter, there is not.

Strong as this is we find in Montaigne a stronger thought:

"Is it not marvellous that this drop of seed from which we are produced should bear the impression not only of the bodily form, but even of the thoughts and inclinations of our fathers? Where does this drop of water keep this infinite number of forms? And how does it bear these likenesses through a progress so haphazard and so irregular that the great-grandson shall resemble the great-grandfather?"

Blandford says: "Two laws of nature are concerned in the production of these phenomena. One is that peculiarities and abnormalities are apt to recur in descendants for many generations; the other, that there is always a tendency to return to the type of health in beings which have sufficient vitality to perpetuate their existence and carry on their race for successive generations."

We do not always produce an idiot from a neurotic family.

Again, one or even more of a family may be insane or idiotic, the others normal, showing the taint concentrated, as a result possibly of surrounding conditions and temperament of parents at the time of conception, combined with prenatal influences upon the mother.

Thus, every idiotic child bears the mark of some inherited tendency from some ancestor.

I shall here cite a case among my own patients, in which a male idiot, born of imbecile parents, possesses the face and form of the mother, with the disposition of the father, a type of both physical and moral imbecility.

Neuroses are frequently interchangeable in transmission from generation to generation, and there are two great laws—the reversion to the original healthy and perfect type when the taint is less noticeable in generations, until it at last is not found at all; or it becomes more pronounced, and a simple nervous disease may appear in successive generations in the form of a pronounced neurosis.

From Ireland[1] we have the following: "Of all known diseases, perhaps idiocy is most frequently propagated by heredity."

Moreau, of Tours, affirmed that heredity was found in nine-tenths of his cases, but he gave no statistics.

According to George Wallington Grabham,[2] heredity is the chief agent in the production of idiocy. Although in his statistics he collects but 18 per cent., he is convinced that the taint exists in a far greater proportion.

Dr. Shuttleworth, in a recent personal letter, writes: "My opinion is that heredity plays a very important part in the production of idiocy, though we cannot prove the frequency by statistics so completely as the fact is impressed on one's mind by intercourse year after year with the relations of acknowledged idiots and imbeciles.

"Taking only the friends' statements, we should be much misled, and for that reason I declined, when at the Royal Albert Asylum, to publish each year any table of causes. . . . . But as one got to see more of the relatives, one gradually accumulated a considerable body of evidence, and this has been summed up and compared with Dr. Beach's experience at Darenth." These observations are as follows: The most frequent hereditary factor is pulmonary tuberculosis, which is found existing in 28.31 per cent.; inherited mental weakness, 21.38 per cent. (16.47 per cent. family history of insanity, 4.69 per cent. family history of imbecility), whilst in 20 per cent. there was a family history of neuroses.

Fletcher Beach subsequently made some further

[1] On the Diagnosis and Prognosis of Idiocy and Imbecility, p. 1.

[2] Remarks on the Origin, Varieties, and Termination of Idiocy.

studies alone at Darenth, and found heredity in 76 per cent. of these cases.

In 1856 the Legislature of Connecticut[1] appointed a commission to investigate the causes of idiocy. The questions propounded were as to whether there had been idiocy, insanity, blindness, deafness, epilepsy, or any other defect, mental or physical, in the immediate or collateral family of the idiot.

The commission reported that out of 164 cases it found 70 in which heredity was undoubtedly the cause: in 10 cases idiocy in the parents; in 6 in the various relatives; in 6 insanity in parents; in 8 insanity in relatives; in 8 epilepsy in parents or relatives; in 2 blindness; in 1 melancholia in father; in 13 dementia following insanity in relatives; and in 16 one or more of the defects mentioned, but not designated.

In the census of 1873, taken at Berne, 55 per cent. of the idiots came from neurotic families.

Dr. Langdon Down,[2] who has made an interesting series of investigations in 2000 cases, reports 45 per cent. as caused by various neurotic affections in one or both parents. If the mother were afflicted, the first children born were sufferers; if the father, the later children.

Haller cites the cases of two imbecile women of noble birth and immense wealth who married, and many of whose descendants for more than a century, even to the fifth generation, were idiots.

Esquirol,[3] reports the case of an idiotic woman at the Salpêtrière who bore three idiotic children.

Dahl[4] made careful comparative studies of the ancestry of 169 idiots and 151 insane. In the former he found that 84, or about 50 per cent., had insane relations. Among the latter there were 58, or about 38 per cent., whose relatives also presented marked symptoms of idiocy and insanity. Among these the parents of 18 insane and 21 idiots, about 12 per cent., also exhibited some mental defect. Among the idiots there were two cases in which both parents were mentally tainted, six in which the father, four in which the mother, four in which some or all of the grandparents, and five in which the great-grandparents were afflicted with mental disease. It will be noticed that the great-grandmothers predominated in transmitting the taint, but Dahl gives no explanation of this.

Dr. James R. Dunlop reports the case of a weak-minded father and mother who had seven imbecile children. He was so much interested in the case that he made a number of careful investigations. For four generations there had been some evident neurotic taint, but it was not marked in the third. The progenitor was a neurotic, and was married to a fairly intelligent woman. To them were born four children, three males and one female. The female was an imbecile, and had a son, in no way peculiar, born out of wedlock, but whose father she subsequently married. She had no other issue. Of the males, one is reported sane, one feeble-minded, and another eccentric if not imbecile. The last married a healthy woman eleven years younger than himself. They had eleven children, seven of whom were imbecile or idiotic. One, Jean, has had an illegitimate daughter who was said to be normal. One, Thomas, a hypochondriac, was said to be peculiar in looks and manner, but not weak-minded. He married a sensible woman, and had an imbecile child. James, sane, but peculiar in manner, irritable, and fretful, had eight children that were perfectly healthy.

Fletcher Beach also quotes an interesting case in which the predisposition can be traced through four generations: G. B., aged fifteen years, an imbecile, was paralyzed on the left side. Her great-grandfather was not in full possession of his senses. The grandfather was reserved, and the grandmother excitable and peculiar. The father was a neurotic, ill-tempered and morose. The father's two brothers and one sister exhibited no peculiarity, but the oldest children of both brothers exhibited the same peculiarity as the patient (G. B.). The sister's oldest child is also peculiar. From the father springs G. B., whose eleven brothers and sisters died of spasms during dentition. It will be seen by this that the neurosis running through the family touches the third generation but lightly, and intensifies itself in the fourth.

Two family histories of my own patients are interesting studies in heredity:

A. B. was an apathetic idiot. Huntington's chorea has existed in the mother's family for many generations. The maternal grandmother was choreic, the maternal grandfather tuberculous. Of this marriage there were born seven children; the order of birth, ages, and sex were unknown, with the exception of the mother of A. B. Three children are alive and married, and extremely nervous. They have children said to be normal in every respect. The four deceased children, including the mother, died of chorea. The paternal grandfather and grandmother were both strong and healthy, and lived to unusual old age. Their issue consisted of nine children, the sex, age, and order of birth being unknown. All were healthy. The mother of A. B. was always delicate, and three days after marriage was attacked by chorea, of which she died after twenty-three years. She had eight children, the oldest two—male and female—said to be normal. Both are married and have healthy children. The third is a female, and is deaf and dumb; the fourth is a male, and imbecile; the fifth, A. B., is a female, and an idiot. Three children were born after this one, of whom nothing is known except that they died in early infancy of epilepsy, diarrhea, and one was stillborn.

H. W., a high-grade imbecile, was the eighth child, and the first-born of twins in a family of fifteen, nine of whom are dead: four from convulsions in infancy, two stillborn, one from scarlatina, and two, including the patient, of meningitis. Of the six children living, five are said to be normal, and one a shameless harlot, who is practically a paranoiac. Both father and mother came of pronounced neurotic families. The father was peculiar, morose, intemperate, and died in his fifty-first year, of apoplexy. His first cousin was an imbecile. The mother is considered very peculiar.

Howe[1] tells of three towns situated in close proximity to each other in which are a number of families in which both parents and children are imbecile. He tells also of

[1] Report of the Commissioners on Idiocy to the General Assembly of Connecticut, 1856, p. 35.

[2] "Causes of Idiocy and Imbecility," British Medical Journal, 1873.

[3] Heredity: Th. Ribot, p. 130..

[4] Bidrig til Kundskab om de Sindssyge i Norge af Ludvig Dahl, Reservelaege ved Gaustad Sindssygeasyl, p. 78.

[1] Causes of Idiocy, p. 78.

an indigent female idiot living in one town who married, with the sanction of the town authorities, a male idiot, who was not a pauper, with three idiotic children as a result.

Dr. Isaac N. Kerlin, my master in the work, in 1880 presented a valuable paper on the "Causation of Idiocy based upon the Analysis of One-hundred Idiots and Imbeciles." He found that 28 per cent. were caused by insanity and feeble-mindedness, and 57 per cent. by various nervous diseases.

In my own experience, based on a careful examination into the family history of 1044 idiots, I find 397 families, or 38 per cent., with a history of insanity or imbecility, and 225, or about 21½ per cent., with a history of various neuroses.

There is one point so nearly allied to our subject as to demand at least a passing consideration.

Consanguinity is commonly accounted a fruitful cause of idiocy; but comparative investigation shows, first, children having both mental and physical defects, the offspring of healthy unrelated parents; second, perfectly developed children with no personal peculiarities whatsoever, the issue of consanguineous marriages. This would lead us to accept the statement that consanguinity has but little if any influence in the production of idiocy, unless there be some hereditary neurosis.

Heath maintains that if the blood be pure and uncontaminated there will be no bad results from such marriages.

A confirmation of this may be found in the history of the Hebrews, which shows repeated examples of consanguineous marriages, the intermingling of pure blood giving only good results, idiocy being the exception rather than the rule.

The statistics that I have been able so far to gather run thus: In 1865 the population of Batz, Brittany, numbered 3300. Five marriages took place between the cousins-german, thirty-one between second cousins, and ten between those of third degree. The issue of the cousins-german numbered twenty-three children, free from all disease both mental and physical. The second cousins had 120 children, normal in every respect, and the issue of the cousins of the third degree numbered twenty-nine children, also perfect. Two women were sterile. Insanity, idiocy, and nervous diseases were unknown in this community.

Dr. Kerlin found but 7 per cent. of his cases examined directly traceable to consanguinity. In my own examinations of 1044 idiots I find but 3⅓ per cent. On the other hand, consanguineous marriages of persons with the least neurotic taint must always be marked by deterioration of mental power. Naturally, if the taint exist in both parents, the force is but intensified, and idiots are likely to be produced with peculiarities accentuated. A notable example of this is found in Switzerland, where, among the people secluded from the outer world in mountain fastnesses, intermarriage has been going on for centuries. Here, by repeated intermarrying, neuroses are preserved intact and idiocy ripens.

Among my own records I find an interesting case that I herewith present:

J. F., an excitable idiot, was born of cousins-german, in whose families were marked neuroses. The mother was always delicate, and finally died of pulmonary tuberculosis. The father was emotional and silly to the verge of imbecility. The following is an account of their offspring: The family, a large one, numbered eleven in all. Four died in early childhood (from diseases unknown); three are living, but of them I have no history, and of the remaining four I have records. One was the first born, a female, and was deaf and dumb; the next was the second born, also a female, and was epileptic; the next was the third born, a male, and was an idiot; and the last was the eighth born (the patient), and also an idiot.

Frequently idiocy appears as the outward and visible sign of the mental deterioration of a family in which intermarriage has been frequent, especially of one that has been noted for its intellectual qualities, and, according to Griesinger,[1] it is a mark of degeneration in a race whose blood has stagnated, as, for example, in the Asylum of L., where many of the proudest names in England are borne by drivelling idiots.

Esquirol says that it is simply impossible to enumerate the idiots in the noble families of France, among whom intermarriage is frequent, and also among the Roman Catholic families of England and Scotland.

We have considered to-night, not possibilities or chimeric maybes, but grim *facts* gathered through years at much cost and pains, by patient, earnest, thoughtful, philosophic minds. Let us come up from their past with the lamp of experience they have placed in our hands to study the present and verify their conclusions.

What are the signs that tell of this enemy who shall come in like a flood? What standard shall we lift up against him? It is said that the pulse of a nation's prosperity is found in its marts—the danger-signals are read at its bourse.

Where shall we judge of the intellectual status of a nation but in its educational centers. Schools, colleges, universities multiply with unprecedented rapidity over a land that has just celebrated its fourth birthday among the centuries of civilization.

Through these corridors, out from these doors, press in mad haste for the arena of life, young men and maidens, warm blood, freighted in many cases so fatally with the miasma from some remote ancestor, often doubled and quadrupled in intensity by consanguineous marriages, waiting but for this unhealthy and artificial atmosphere to develop into abnormal growth.

Do we ask why are the hopes of fond parents so often blighted? What becomes of these fair buds of promise?

Go find the answer in those other schools that are growing apace in our midst, dotting from ocean to ocean our own fair land, while others stretch out appealing hands to us—schools public and private that offer no prizes, or hope of diplomas, yet that are also multiplying with frightful rapidity in response to the agonized cry of the Rachels weeping for their children, and who will not be comforted, because they are not.

The attention of many medical men is drawn to the influence of intemperance in parents as a cause of idiocy. The statistics, however, are too meager and the statements too unreliable for us to base any definite conclusions upon them. The Connecticut commission found

[1] Mental Pathology, p. 349.

32.34 per cent. My own experience shows 18.38 per cent. Langdon Down lays special stress upon the intoxicated state of the father at the time of conception, an opinion advanced years ago by Toussenel,[1] and verified in one instance in my own practice.

Ludvig Dahl agrees that to the abuse of brandy by the fathers, and also to some extent by the mothers during pregnancy, may be assigned the most important influence in the production of the large number of idiots in Norway.

Upon the influence of pulmonary tuberculosis, held by many as an important factor, I have not entered, as it is largely embraced in the points already elaborated.

The last example I have to offer, and by far the most appalling on record, is that of the family known as "The Tribe of Ishmael," whose history traced through a period of forty years shows descendants of one unclean, neurotic man, multiplying by consanguineous marriages into two-hundred-and-fifty families, numbering some five-thousand individuals, whose continuous criminal record has poured over the Northwest a flood of imbecility and crime.

Can we, in the face of such evidence, refuse to accept inheritance as one of the fundamental laws of life?

The mark of the beast is ever present—the spoor of the wild animal remains—and to-day we trace it not only to the third and fourth generations, but on *ad finitum*.

DR. JOHN B. CHAPIN then read a paper entitled "Heredity, its Relation to Insanity and Idiocy." There has always existed a deep-seated conviction that certain diseases are transmissible by inheritance from parent to offspring. This conviction is strongly fortified by an array of statistics that, if accepted without reservation, might in themselves establish the fact. It is quite common to place insanity and idiocy in this category. So prevalent is the belief that insanity is directly transmitted by inheritance that in medico-legal proceedings it is usual to consider it a strong defence to show that insanity existed in the family of a person charged with crime. So well grounded is the opinion that insanity may be due to a direct inheritance that its existence is the shadow that darkens households, affects plans of domestic arrangements, blights the happiness, and shapes the destinies of a large number of persons. Doubtless the mystery that surrounds the complex operations of the mind, the reported results of observations by physicians, the absolute ignorance of the laws of heredity, beyond the ken of human comprehension, have together conduced to the acceptance of speculations as actual results of well-established facts. Doubtless, religious views, coincidences of events, overworked facts, and ignorance have exercised an influence in the formation of opinions on this subject and their unquestioned acceptance.

That every species produces its kind is a universally recognized law. That there are physical and psychic characteristics that belong to the individuals making up the many nationalities and that are transmitted and preserved from generation to generation; that there are so-called temperaments that have a certain uniformity of physical and psychic development, so that they may be recognized and described, is a matter of common observation. Darwin has also presented the theory "that each of the atoms or units constituting an *organism* reproduces itself."

Heredity manifests itself in family likeness, the hair, gait, height, form, temperament, and physical development. The "atoms or units" proceed in accordance with some uniform law of development, so that, however the stock may be crossed, the rule is that man transmits his exact physical counterpart, subject to modification due to environment, climatic conditions, etc. That the vigor of the stock does not abate is witnessed in the fecundity of the human race.

Whether a similar unvarying law governs the transmissibility of psychic qualities may be a question or in doubt. The same consensus of opinion, however, is disposed to conclude that mental traits are transmitted from parents to children in the same degree that physical qualities are inherited. This is only partly true, but the exceptions are so numerous that it may be considered a chance that the children will possess the psychic qualities of the parents. It has been demonstrated by histories of families in England that strong qualities of mind have been transmitted through generations. On the other hand, this society may be familiar with the history of a family in New York State comprising twelve-hundred persons of several generations, traced by Mr. Dugdale, who as paupers, lunatics, idiots, criminals, murderers, and prostitutes were estimated to have cost the county of Ulster the enormous sum of one-million-three-hundred-thousand dollars ($1,300,000). In making inquiry into the ancestry of a certain family in Yates County, New York, it was ascertained definitely that twenty-two insane persons, criminals, paupers, or idiots could be traced in two generations to an abandoned woman. The influence of marriages of consanguinity deserves a notice in this connection. Dr. S. M. Bemiss collected some statistics that show the nature of the deterioration that may come from this source. Of ten instances of incestuous commerce 31 children were born; 29 were defective, viz., 19 idiots, the remainder epileptic or deformed. Of 823 marriages of cousins, 3942 children were born, of whom 1105 were defective, 145 deaf and dumb, 85 blind, 308 idiotic, 60 epileptic, and only 38 insane. The results of consanguineous marriages furnish an heredity of physical imperfections rather than of psychic disease. Notwithstanding these results, and the necessarily crude notions that commonly prevail, as well as the probabilities they suggest, it must be stated that there is absolutely no unvarying law of transmission established by these reported facts, because of well-known exceptions.

The average normal psychic development is not so often due to transmission or inheritance as to influences of environment, education, the degree of mental receptivity, together with the evolution that goes on from age to age. The quality called genius and knowledge does not seem to be transmitted by inheritance, but a receptive faculty, a capacity to acquire knowledge and evolve ideas, may be an heredity. The term heredity is well defined as "the principle or fact of the transmission of physical or mental qualities or tendencies from ancestors." (Gould's *Medical Dictionary*.) The instances of the transmission of "qualities and tendencies" that have

[1] "On sait que les enfants se ressentent généralement de l'influence passionelle qui a présidé a leur conception. La plupart des enfants procrées dans l'ivresse bacchique."—Monde des Oiseaux, p. 106. Quoted by Ireland, Idiocy and Imbecility, p. 27.

been cited, and those results that sometimes appear after consanguineous marriages, are marked examples of both physical and psychic deterioration, mental and moral degeneration, of mental and bodily failure—increasing in intensity with successive generations, and of those defects that follow such marriages, according to the principle of reversion or degeneration, in a backward direction, even to the extinction of the line of succession. Dr. Seguin observed: "I have not, to my knowledge, ever had to attend an idiotic son of an idiot, or even the son of a man of weak intellect."

An hereditary disease is one that may be transmitted directly from parent to child, Admitting that it is established that certain physical diseases are inherited, can it be shown that insanity should be classed in this category? If it is not an *inheritance*, may it not in certain cases, be ascribed more properly to the results of heredity? And within what limitations? Individual opinions, formed from a knowledge confined to a limited number of cases lead some to a conclusion without further reflection. Psychologic theorizing leads others to collect data to support their views, and a personal element comes to enter in to throw doubt upon the value of any statistics. Hospitals for the insane have contributed their quota, which their medical officers have reported. Thus, Esquirol reported that 0.33 per cent. of his cases were hereditary; Brigham, 0.26 per cent.; Thurnam, 0.32 per cent.; Aubanel, 0.4 per cent.; Burrows, 0.85 per cent.; Hood, 0.9 per cent.; Moreau, 0.90 per cent. These statistics were all compiled prior to 1860, and cover a period of fifty years. What rule was applied in their preparation does not appear. The wide range of results at once suggests a great lack of uniformity of material, wide differences in opinion about what constitutes inherited insanity, and a wide latitude in speculation. Since 1860 the percentum of reported cases of hereditary insanity has decidedly fallen off, although insanity has greatly increased. In some reports of hospitals neither "hereditary insanity" nor "heredity" appears in the list of assigned "causes." In other hospitals the number of cases assigned to heredity has been steadily declining. At the Pennsylvania Hospital for the Insane, among 10,562 cases heredity was assigned as a cause of insanity in eight cases in every thousand. At the Utica (N. Y.) State Hospital, where statistics have been prepared with a considerable degree of uniformity, the annual percentage varies from four to six. While in some of the American hospitals it is somewhat larger than that just named, generally the reported percentage in European hospitals is very much greater than in this country. Possibly this is owing to different social conditions that prevail, in-breeding, debauchery of parents, greater mental and physical deterioration, the lines on which observers have made up their statistics, as well as the tendency to accept and follow views of recognized authorities. Whatever may be the explanation of the differences of reported results, it is apparent that in recent years the tendency is to attach less importance to the assumption that insanity is directly transmissible by inheritance. By many it is wholly ignored as a direct factor in the production of any considerable amount of insanity—at least inheritance is not named as an assigned cause. If the statistics presented had been prepared by observers holding the same theories, and from exactly the same data, there could be but one conclusion—that the inheritance of insanity (if there be such a thing) is rapidly diminishing.

Referring to personal observations, an examination of three-hundred-and-forty seven patients admitted during two years to the Pennsylvania Hospital showed that the probable and direct causes of insanity in one-hundred-and-eighty cases were neurasthenia, or nervous exhaustion from overwork, strain, and worriment; some form of general ill-health; the puerperal state; septic conditions, etc.; and the element of inheritance did not appear or was not ascertained. The remainder were cases of paresis and other forms due to brain-degeneration, senile failure, or organic disease, some with a history of marked heredity. Twenty-seven, or 14 per cent. only, had a family history sufficiently marked to warrant the assumption that heredity was the probable cause of the insanity—that is to say, there had been insanity in parents or along a family line. Exceptionally marked instances of insanity in families have come under my notice, of which two may be briefly presented: Three sisters were brought to the Pennsylvania Hospital on the same day. A brother, said to have been demented, had died about two weeks previously, as was inferred, from gradual inanition and neglect. All had similar delusions of suspicion, of the operation of unseen agencies, which extended to their food, clothing, beds, the air of their rooms. The family history could not be obtained satisfactorily on account of the extreme reticence of all parties. The father had held a high official position under the government. It was an illustration of those cases of rare occurrence in which insanity is communicable in a family, or to persons closely allied in companionship and life, with few relations with the world about them. In this case one sister became insane, and gradually dominated by her superior will-power the other two. From the eccentricities of these people, their isolation and physical appearance, there had evidently been a degeneration, physical and psychic, from the normal family standard.

Recurring to the reference made to three-hundred-and-forty-seven cases, it was stated that in one-hundred-and-eighty-eight the cause in each was directly traceable to some incident in the life of the patient or to a physical deterioration or disease. There were sepsis, loss of body-weight, deterioration in the quality and constituents of the blood. The nutrition of the brain was impaired, and while many thousands of persons suffer in some degree from the same conditions and recover, insanity, which is so often only a relative condition, was but a further incident in the cases cited. In other words, insanity, or mental disorder, as in these cases, was acquired. More than one-hundred-and-forty recovered. Now, will it be said that they had acquired something they could transmit as an inheritance? If so, what was it? Is there anything material, as a bacillus of insanity, that may be received as an inheritance? That a neurotic temperament may be inherited is believed to be in accord with common observation. Such, however is the superstitious, vague sentiment existing in relation to insanity that a fear of contamination is the family skeleton. In relation to the class of cases we are now considering, it is a practice to assure relatives, when recovery does take place, that the probability

of a recurrence or of the transmission as an inheritance is no greater than in those persons observed by the physician who have a pneumonia, rheumatism, or fever. Suppose the fact were otherwise, and insanity in some degree was directly transmissible by inheritance, surely man would rapidly deteriorate and degenerate until mental soundness would be of rare occurrence, and in the case of idiots and imbeciles the race would end, as it would cease to procreate.

In the procreation of children, if both parents are of exactly equal potency and not related, the expectancy will be that the physical and psychic characteristics of their children will have a close resemblance to those of the parents. Thirty-one marriages of parties not known to be related or to be descendants of relations produced two-hundred-and-seven children. None of the children was reported to have been born with any defect. (Dr. Bemiss.) If the potential power of one parent is less than that of the other (and this may be the general rule), while the expectancy would be that the offspring would partake of the stronger parent, there is no absolute rule, even here, notwithstanding the probabilities. There is a corrective process in constant operation. That nature constantly eliminates wholly or limits the influence of the weaker element is certainly true, as many families show members of very opposite degrees of psychic development. The reverse is also true, that deterioration is sometimes not wholly eradicated, but continues in an increasing degree. Two persons of marked neurotic organization may transmit their temperament to offspring in a more intensified form, and in the second or third generation, if there is no cross by which it may be by chance corrected, a neurotic heredity or predisposition is established, from which may come, with slight exciting cause, some form of mental degeneration, acute insanity, epilepsy, etc. In-breeding of temperaments, then, rather than consanguineous in-breeding, is more conductive to the development of the neuroses, to eccentricity, and insanity of the degenerative type.

In the discussion of heredity in its relation to insanity and idiocy an attempt is made to show the diversity of facts and views that exists, that there is often a personal element that enters in the preparation of statistics, that there are limitations of our knowledge; also to formulate an expression of views or principles which are now presented as conclusions:

1. Physical characteristics, those distinguishing the human species, are transmissible as an inheritance.

2. Knowledge, genius, and culture are not an inheritance, but depend rather on influence, education, and environment. Mental receptivity is transmissible. Psychic qualities are not necessarily an inheritance, requiring favorable surroundings and circumstances for growth and development.

3. Insanity as a disease is not transmissible by inheritance, but may be acquired or evolved from a neurotic heredity as a basis.

4. A neurotic predisposition is transmissible by inheritance, but there is no absolute rule that it will be transmitted in any given case, or in any case.

5. In-breeding of neurotic temperaments is most conducive to the creation of a neurotic heredity.

6. Idiocy and imbecility may be a defect having an origin in consanguineous marriages, pre-natal conditions, accidents, arrested development, infantile meningitis, tuberculosis, and lack of potency on the part of one of the parents from unexplainable causes.

DISCUSSION.

DR. J. MADISON TAYLOR said that the term heredity, as used by speakers, seemed somewhat vague. Even when modified by the term inheritance, and otherwise qualified both in the papers and among neurologists generally, it is by no means clear. In estimating the scope and influence of heredity it is imperative to construe the term much more broadly, and to divide it rather into racial characteristics and tendencies, and the intermingling of these when races fuse (as here in America they do so largely), and then come down to a consideration of the peculiarities of localities and families. One thing is quite obvious from the records of Elwyn and Vineland, especially those made in the past years, that the testimony as to heredity as a factor is made vague and uncertain by many inherent difficulties, not the least of which is the unwillingness of parents to impart exact information. The only way by which this subject can be fairly judged is the very difficult one of systematically sifting all sources of testimony. Americans form a very composite race, which is becoming more so—originally of Anglo-Saxon stock in Virginia and Massachusetts, and between these an admixture of Dutch, English, and Swedes, then in Louisiana French, and now in the great Northwest millions of Slavs. In New York City alone nowadays the foreign element is tremendous, with over a half-million of Germans, four-hundred-and-fifty-thousand Irish, with Jews, Poles, Hungarians, and dwellers in Mesopotamia, "and of heathens not a few." Moreover, within the last quarter-century the character of the foreign element has changed in quality as well as in race. Being the dumping-ground of European refuse, an element of confusion enters in the physiques and characteristics of the American people of startling significance. This offscouring of the nations, representing largely abnormalities of the criminal, insane, and in various ways inferior and unstable constitutions, would seem to threaten the direst results. And yet, such is the vitality and robust vigor of American stock or climate, or social or political conditions, as statistics go to prove, that the evil tendencies that might safely be predicted from these chaotic elements do not result in the increments of criminality and insanity it would be reasonable to assume and fear. It is safe also to assume, upon adequate grounds, that the American nation is steadily improving in bodily, mental, and moral health.

Again, in judging of hereditary conditions, one must compare the tendency of physical diatheses, as of tubercle and scrofula, the toxemias, alcoholism, syphilis, and various phases of environment and education. "No man is ruined except in a line of his own propensities," and errors are always committed along the line of least resistance. When the transmission of qualities is downward and for evil the element for encouragement is never lacking. The function of heredity being the retention and transmission of tendencies, it requires suitable opportunity, and these may give a direction upward as well as downward. Qualities of heart and mind, or body and soul, may be dominant or subordinate, patent

or latent, but are inevitably moulded by environment. There are evil tendencies enough throughout the realm of nature, and of sufficient strength to destroy us all, but, unless opportunity and encouragement offer, these may subside in safety. Multiply the safeguards, withdraw the encouragement, improve the environment; above all, raise the standard of self-respect, especially of sobriety, and these dormant tendencies will cease to be, as is proved about us every day. Moreover, even considering those saving peculiarities that dominate the race, and act as equating forces, such as the attraction of opposites, even here the tendency is for good to prevail. When we are better able to study and understand and control environmental conditions, the trend of heredity can certainly be checked, at least the evil trend. We shall be then left mainly with accidental and unexplainable conditions, for even now it very frequently happens that cases of insanity and idiocy occur in which it seems impossible to trace out any adequate cause.

But, lastly, the most important factor of all is evil disease and pernicious habit. Specific disease and nutritional ones, but worst of the lot, alcoholism, chronic or transient, or the pitiable instances of absolute want and insuperable physical conditions, hurtful occupations and vile dwellings: these are remediable, and yet not to be remedied.

DR. A. W. WILMARTH stated that he is a believer in heredity, and that his opinions are based upon a long experience with the feeble-minded. The parents of the cases that are brought in are often to be found eccentric or feeble-minded themselves. Some of these feeble-minded women produce large families of defective children. A case was recalled in which a woman from Pittsburg had nine feeble-minded children. Another woman was the mother of six microcephalic idiots, and she will probably marry again as soon as her husband dies, and have more of the same kind of children. The degeneracy very often takes on a progressive type, and the marks are more evident in successive children. Two cases at Elwyn illustrate this. One child was brought by its mother, paralyzed in its legs and without the power of speech. It had, however, an intelligent look in its eyes and did not appear to be an idiot. A year later the mother presented herself with a second paralyzed and speechless child, which was an idiot, but with a different name. The father of the first child had died, and the mother had married a man who had not come to that region until after the first husband had died. They were both strong laboring men of ordinary intelligence. This showed that the degenerating tendency had increased in the woman by marriage to a man stronger than herself.

Another illustration is that of a man and his wife, in the town of Attleboro, who had a large family of degenerate children. Two of the children, a boy and a girl, were adopted into different families of respectable people to be brought up. The girl grew up feebleminded and the boy became a thief. He forged a check and ran away to the West, where he married. He had a daughter, who grew up to be a prominent woman in society and church. She had a son, who one night got up and robbed the house and disappeared. She had also a daughter, who grew up to be a shameless harlot. This family for four generations showed the evidence of heredity.

DR. BARR called attention to the early history of Maryland, where the community was divided into three classes—namely, gentry, servants, and convicts, the first-named with more or less neurotic taint.

Among the gentry, kept absolutely distinct for years, consanguineous marriage was the rule rather than the exception, and we find a large proportion of insane and idiots up to the time of the civil war; this proportion then decreasing as the classes intermingled by marriage.

DR. CHAPIN observed that confusion arises from the use and misunderstanding of terms. Inheritance and heredity have been used as synonymous terms. An inheritance is something that one receives from a parent or ancestor —something material that is transmissible—and in the case before us a disease. An heredity is a condition made up of the "physical or mental qualities or tendencies" derived from ancestors. It was pointed out that 65 per cent. of acute cases admitted to one hospital had no inheritance, although many had an heredity—they had inherited no disease from their ancestors, and had no disease they could transmit. The defects of body and mind that come to our knowledge make an impression from the mystery that surrounds all such cases; but we do not in this connection take sufficient account of the large number that show no defect, although there may be defects in the parents. We all know that parents who have consanguineous connections or who are insane have children, some of whom are every way bright and normal, while some may not be. That a neurotic predisposition or a temperament may be transmitted and intensified is established, and this is an heredity that may be a predisposing cause or soil out of which insanity may be evolved. Although conclusions are presented, the subject of heredity is one about which no agreement can be expected, as so much remains a matter of speculation. There is a limitation to human knowledge. It has been stated that the amount of insanity in Europe attributable to heredity is greater than in America. This may be due to the blending of nationalities and the influx of a vigorous physical stock. My own observations and examinations of statistics in the United States would lead to the opinion that insanity may be ascribed to heredity in about 6 per cent. of the admissions to the hospitals, and that neurotic temperaments are transmitted by heredity. Two or three generations of neurotics are sufficient to develop insanity, or, in other words, to lead to such defects that disordered physical actions will appear as a result of progressive mental degeneration. We can hardly conceive of a disease that is acquired, as insanity undoubtedly is in the majority of cases, being transmissible by inheritance. Even coincidences in families do not establish such a fact.

NEWS ITEMS.

High Death-rates in England from Influenza.—The unprecedented death-rate in England, largely due to influenza, and especially severe upon old people, has of late in London reached so high a figure as 38.5, and in Liverpool the frightful rate of 55.5 has been recorded.

The Annales d'Oculistique now appears also in an English edition, under the direction of the American editor, Dr. George T. Stevens, of New York.